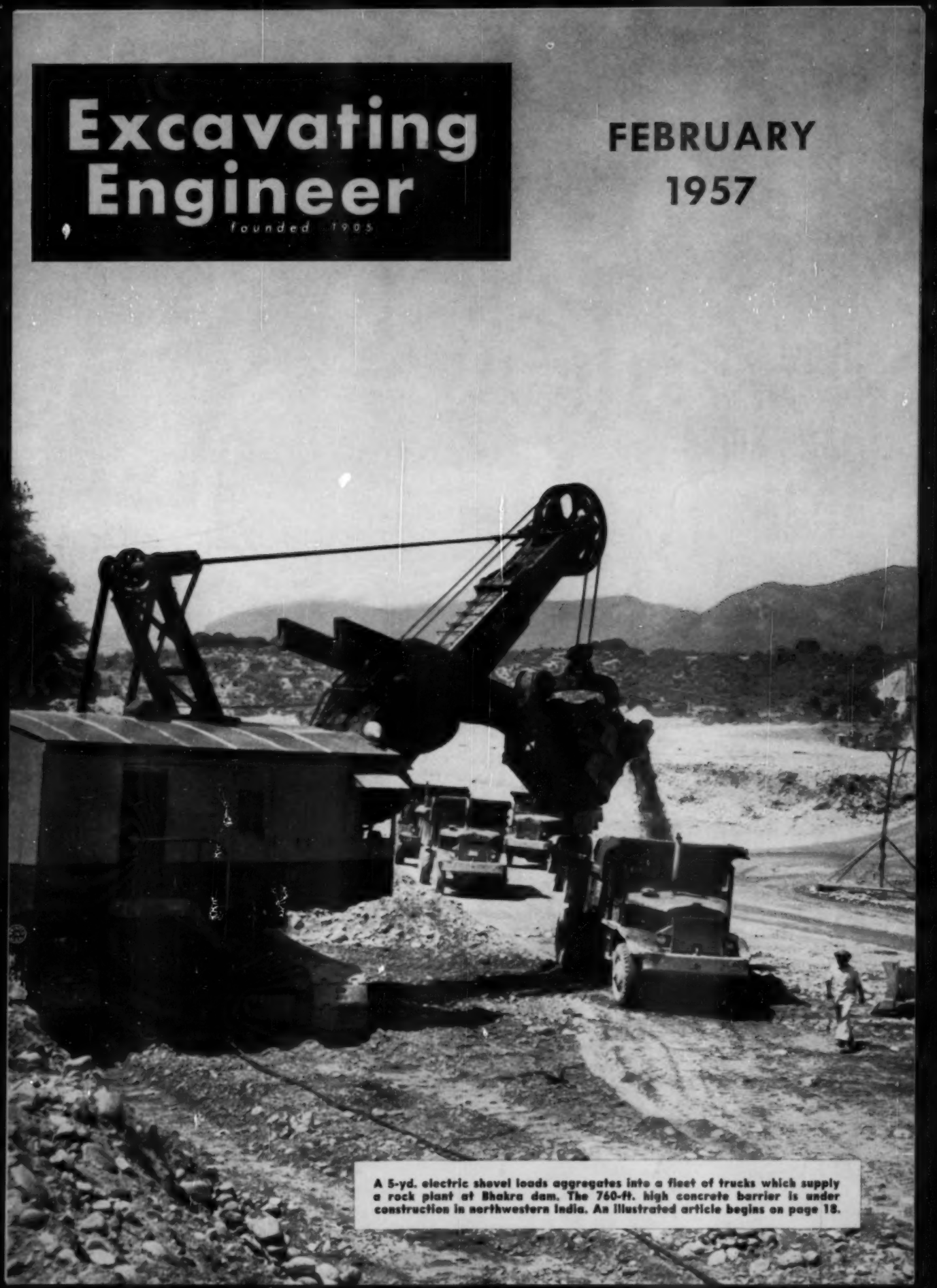
Excavating Engineer

founded 1905

FEBRUARY
1957



A 5-yd. electric shovel loads aggregates into a fleet of trucks which supply a rock plant at Bhakra dam. The 760-ft. high concrete barrier is under construction in northwestern India. An illustrated article begins on page 18.

LOOK! TWENTY PROBLEMS...

BUCYRUS ERIE

H-3 Hydrocrane Can Solve Them All

PROBLEM.....	HYDROCRANE'S SOLUTION
1. Travel time between jobs	Up to 50 mph travel speeds
2. Reach into building, boxcar or semi	Telescoping boom
3. Weigh loads	Load indicator
4. Set up frequently	Hydraulic outriggers that set in seconds
5. Work in close quarters	Shortest tail swing in its class
6. Handle fragile loads	Precision hydraulic control
7. Change boom angle often	Working boom hoist
8. Make high lifts	Boom lengths to 38' (plus 10-ft. or 18-ft. jibs)
9. Lift heavy loads	New 5-ton capacity
10. Inexperienced operators	Easy-to-learn hydraulic operation
11. Dig trench *and* lay pipe	Quick and easy conversion from Hydrocrane to Hydrohoe
12. Excavate short, deep pits	Clamshell or wrist-action utilities Hydrohoe dipper
13. Eliminate hand trimming	Telescoping digging action combined with wrist action
14. Minimize danger of damage to underground pipe, conduit, etc.	Precision hydraulic control
15. Stockpile or load light materials	One-yd. trash bucket or ½-yd. material handling bucket
16. Work on rough, irregular ground	Hydraulic outriggers quickly level machine
17. Travel over lawns, low capacity bridges	Hydrocrane on conventional truck is extremely light
18. Reduce "down" time	Simple design cuts costly maintenance
19. Cut move-up time	Remote control of truck engine (optional equip.)
20. Hoist loads rapidly	New selector valve greatly increases line speed

Yes, the H-3 Hydrocrane is the only ⅜-yd. crane-excavator that does so many jobs so well. Mounted on a new or low-cost used truck, the 5-ton H-3 Hydrocrane is the digging and lifting package that returns more per dollar invested than any other machine in its class. Your Bucyrus-Erie distributor will be pleased to tell you all about the H-3 — and about the larger, 10-ton capacity H-5.

171H57C

BUCYRUS-ERIE COMPANY

South Milwaukee, Wisconsin

With Aveling-Barford Dumpers there's no need to back out on any job. Two-way steering is the answer. Turn the driver—let him see where he's going—and speed can be maintained in both directions of travel—even in tunnels. That is why contractors faced with narrow gulley or tunnel work—like the Eidsvag Tunnel at Bergen shown above—turn with assurance to Aveling-Barford Diesel Shuttle Dumpers. The 4½ cubic yard machine with its four forward and four reverse speeds, gravity or power assisted tipping, and a construction that will stand up to impact loading is ideal for this class of work.

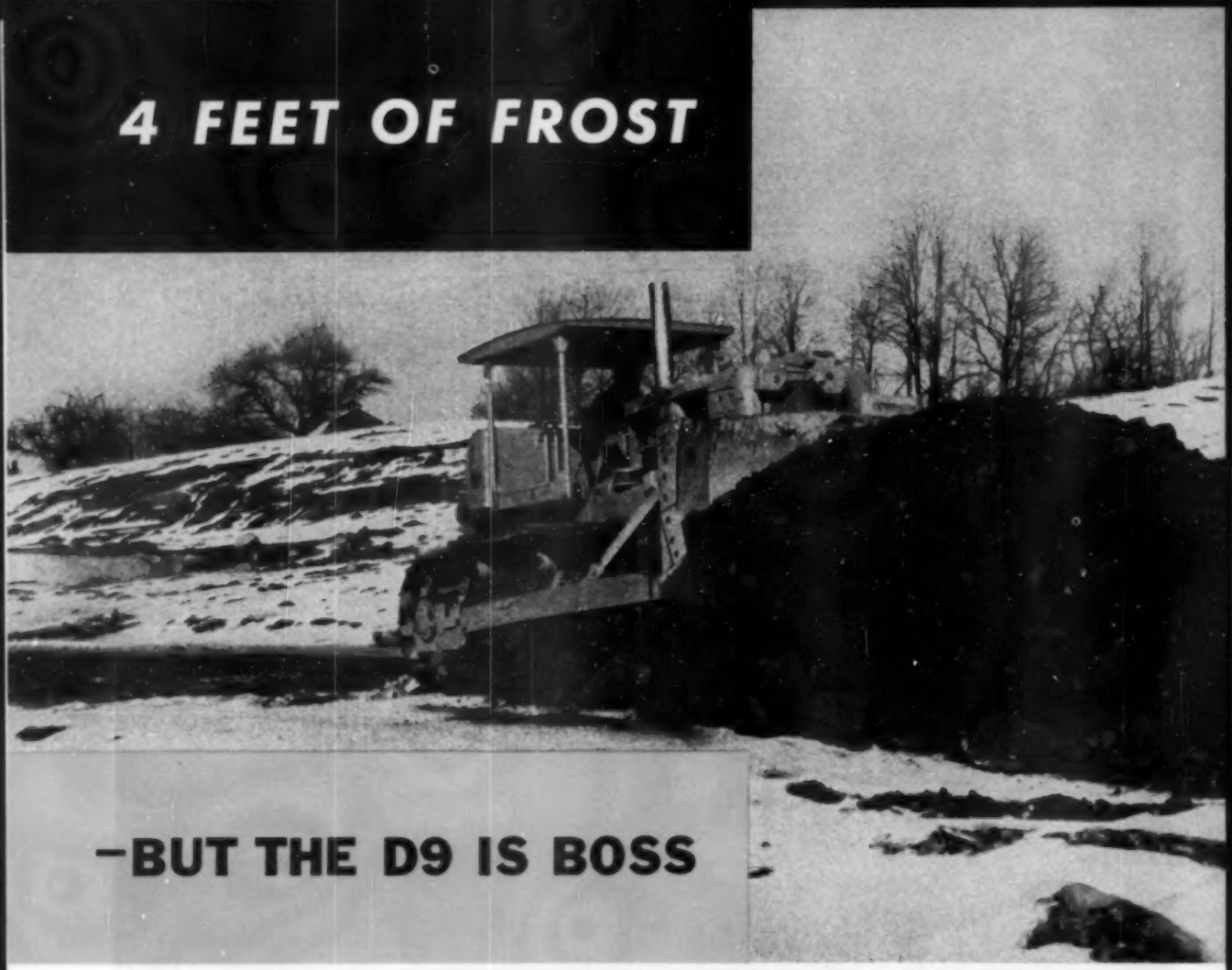
For full particulars please write for catalogue No. 1703/10

AVELING-BARFORD

4½ CU. YD. DUMPER

AVELING-BARFORD LIMITED • GRANTHAM • ENGLAND

4 FEET OF FROST



—BUT THE D9 IS BOSS

Boss of all bulldozers is the giant Caterpillar D9 Tractor. When this picture was taken last winter, John Arborio, Inc., was moving 1½ million yards of frozen earth, 75% of it rock, to build a section of Route 17 in Sullivan County, N. Y. With four feet of frost in the ground, conditions were about as tough as possible.

That didn't stop the D9. With its CAT*-built No. 9S blade, this machine weighs over 34 tons, and its broad tracks with hardened steel grousers give it tremendous 'dozing traction. It has the *power* to dig into hard ground, too—320 HP at the flywheel, and 98,000 pounds maximum drawbar pull!

In repeated tests where accurate records have been kept, one D9 has outworked *two* bulldozers of the next size. Blade loads average 12 cubic yards of earth and are handled at higher speeds. On 'dozing hauls up to 100 feet, cycle times average less than 1½ minutes, and production runs up to 600 cubic yards per hour.

The D9 is big, heavy and ruggedly built to lick the toughest jobs. Yet, with its power-boosted controls and excellent visibility, it's one of the easiest of all tractors to operate. Maintenance is easy, too. The D9 is available with either torque converter or direct drive with oil clutch.

Your Caterpillar Dealer can show you performance records that prove the real economy of the D9 as a bulldozer, pusher or hauler. And he stands behind the long life of every machine with reliable, round-the-clock service and parts you can trust. See him today!

Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

CATERPILLAR*

*Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

HEAVY-DUTY EARTHMOVER FOR THE HARD WORK

Advertisers
IN THIS ISSUE

Allied Steel & Tractor Products, Inc. . . 44
Allis-Chalmers Mfg. Co. 10, 45
American Brake Shoe Co., American Manganese Steel Div. . . 16
American Manganese Steel Div., American Brake Shoe Co. 16
Aveling Barford Ltd. 1
Baroid Div., National Lead Co. . . 52, 53
Bucyrus-Erie Co. . . Cover II, 11, 17, 55, 68
Business Publications Audit of Circulation, Inc. 4
Caterpillar Tractor Co. . . . . 2, 14–15, 39, 59, Cover III
Contractor's School 52
Crosby Laughlin Lebus 47
Drake-Williams Mount 72
Eimco Corp., The 70
Euclid Div., General Motors Corp. . 6–7
For Sale (Classified) 71
General Motors Corp., Euclid Div. . 6–7
Harnischfeger Corp. 42–43
Hayward Co., The 50
Hendrix Mfg. Co. 8
Hough Co., The Frank G. 66–67
Ingersoll-Rand Co. . . . . Cover IV
International Harvester Co. 48–49, 56–57
Kiesler, Jos. F. Co. 69
Leschen Wire Rope Div., H. K. Porter Co., Inc. 64
LeTourneau-Westinghouse Co. . . 9, 51, 63
Lone Star Steel Co. 62
Mack Trucks, Inc. 65
Manitowoc Engineering Corp. 46
Marion Power Shovel Co. 13
National Lead Co., Baroid Div. . . 52, 53
Northwest Engineering Co. 5
Owen Bucket Co., The 41
Porter, H. K. Co., Inc., Leschen Wire Rope Div. 64
Rogers Bros. Corp. 54
Sauerman Bros., Inc. 12

Excavating Engineer

founded 1905

CONTENTS

Volume 51 No. 2 **February, 1957**

India Builds Gigantic High Dam—by Ray Day 18

Comparable to Grand Coulee, India's Bhakra dam takes shape under difficult construction problems. With a height of 760 feet, it will be world's highest straight gravity concrete barrier.

Luck Is Factor in Virginia Roads 26

Five quarries owned and operated by C. S. Luck, Jr., provide much of the aggregates used by the state in building its highways. Up-to-date methods are used by veteran quarry man.

Rocky Road to Durango—by Floyd Suter Bixby 32

Denver firm straightens out tortuous 3.77-mile section of U. S. Route 160 in mountain country of Colorado. Job is called "Heartbreak Highway" because rock excavation is so tough.

News from the Field 38

Estimate 1957 Construction 38
Kitimat Smelter Expands 38
Cement Assn. Head Named 40
British TV Center 40
Illinois SAE Group Meets 41

Obituary—John W. Stang, Sr. 40

Equipment You Ought to Know About 44

Not in the Contract 58

New Trade Literature 68

Notes from the Manufacturers 72

COPYRIGHT 1957 BY THE EXCAVATING ENGINEER PUBLISHING COMPANY

Regular Subscription (payable in advance): 35 cents per copy, $3.50 a year; Canada and foreign, subject to publication policy, $5.00 per year. Special subscription: Upon written request on company letterhead this publication will be sent free of charge to companies, executives and supervisors engaged actively in excavating. Occupation of subscriber must be given for all subscriptions, paid or special. Right is reserved to refuse foreign subscription. Indexed by Engineering Index, Inc. Volumes available on microfilm.

Published Monthly by

THE EXCAVATING ENGINEER PUBLISHING COMPANY

South Milwaukee, Wisconsin, U.S.A.

W. E. WILLIAMS, Editor
M. B. JAEGER, Publisher
H. A. BURKHARDT, Manager
J. C. DeLONG, Associate Editor
E. W. ARNDT, Art Editor
W. C. VAN DYKE, Sales Manager

BPA Member

Ouija boards are passé

Time was, when a person had a question, out would come the ouija board for an answer. This wasn't too accurate a system, of course... but a lot of people put a lot of faith in what the ouija board told them.

Times change — and today accuracy is the keyword. That's why the modern business publication wants its circulation audited.

In joining BPA* the publisher is taking an important step toward sound and accurate planning in your behalf. It means that he is checking, double-checking and constantly rechecking —

- **Who you are**
- **Where you work**
- **What your job is**

He wants and needs this information — and the BPA* audit can assure both him and his advertisers that he is getting his magazine into the hands of people *qualified by their common interests* to receive it. It helps him to give you —

- **Editorials that will *help you in your work***
- **Advertising that will *have value to you***

He can serve you even better if you will complete surveys and questionnaires which he may send you, and if you will give him your thoughts and opinions on the editorials and advertisements in his magazine.

You, the reader, are the *key person* to the publisher — and the BPA* audit helps him in his never-ending effort to think about you and design his magazine for you.

You, the reader, benefit when the circulation of a publication is audited by...

***BUSINESS PUBLICATIONS AUDIT OF CIRCULATION, INC.**
420 Lexington Avenue New York 17, N. Y.

BPA

A Non-Profit, Tripartite Membership Corporation of Advertisers, Advertising Agencies and Business Publications

● Model 80-D on the contract of Tecon, Graff, Parsons.

● Two Northwests on the Grass River Bridge, D.W. Winkelman contract.

● Northwest Pullshovel owned by Iriquois Construction Co. on a lock job.

58 NORTHWESTS on the St. Lawrence Seaway

These contractors have a total of 58 Northwests on the St. Lawrence Seaway

NG SAULT DAM

ST LAWRENCE STATE PARK

ST. LAWRENCE SEAWAY

BARNHART ISLAND POWERHOUSE

Mannix Ltd.
Beaver Construction Co., Ltd.
John Susin Construction Co.
Desourdy Construction Ltd.
[illegible] Construction Co.
[illegible] Pigott & McQuigge
[illegible] Constructors
Walsh [illegible] da) Ltd.
[illegible] Construction Co.
[illegible] Stewart
[illegible] & Gravel Ltd.
[illegible]
Atlas, [illegible]
Walsh, [illegible] Morrison-Knudsen, [illegible] Construction Co.
[illegible] Morrison-[illegible] Co.
[illegible] Morrison-Knudsen, [illegible]
[illegible]wé Corporation
D.W. Winkelman Co.
[illegible] Graffe, Parsons
[illegible] Construction Co.

PRODUCTION PLUS MEANS MONEY

Remember the Turnpikes—the New York Thruway (more Northwests than any other make)—the West Virginia Turnpike (over half the shovel and crane equipment Northwests)—the Ohio Turnpike, the Kansas Turnpike, the Maine Turnpike Extension, the Massachusetts Turnpike, the Connecticut Turnpike, all dominated by Northwest equipment.

Here is another world famous job—a job involving everything from rock to simple material handling—another job predominantly Northwest equipped—over 58 Northwests handling all types of work from Shovel and Pullshovel excavation to Dragline and Crane jobs.

If you are planning on Shovel or Crane equipment, the outstanding leadership of Northwest on both big jobs and small is worth thinking about. There *is* a reason—Northwest Advantages make money. Plan now to have Northwest equipment. Let a Northwest Man give you complete details.

NORTHWEST ENGINEERING COMPANY
1506 Field Building, 135 South LaSalle Street, Chicago 3, Illinois

BUILD BETTER ROADS TODAY · FOR A GREATER AMERICA ·
See you at the ROAD SHOW CHICAGO Jan. 28-Feb. 2, 1957
AMERICAN ROAD BUILDERS ASSOCIATION

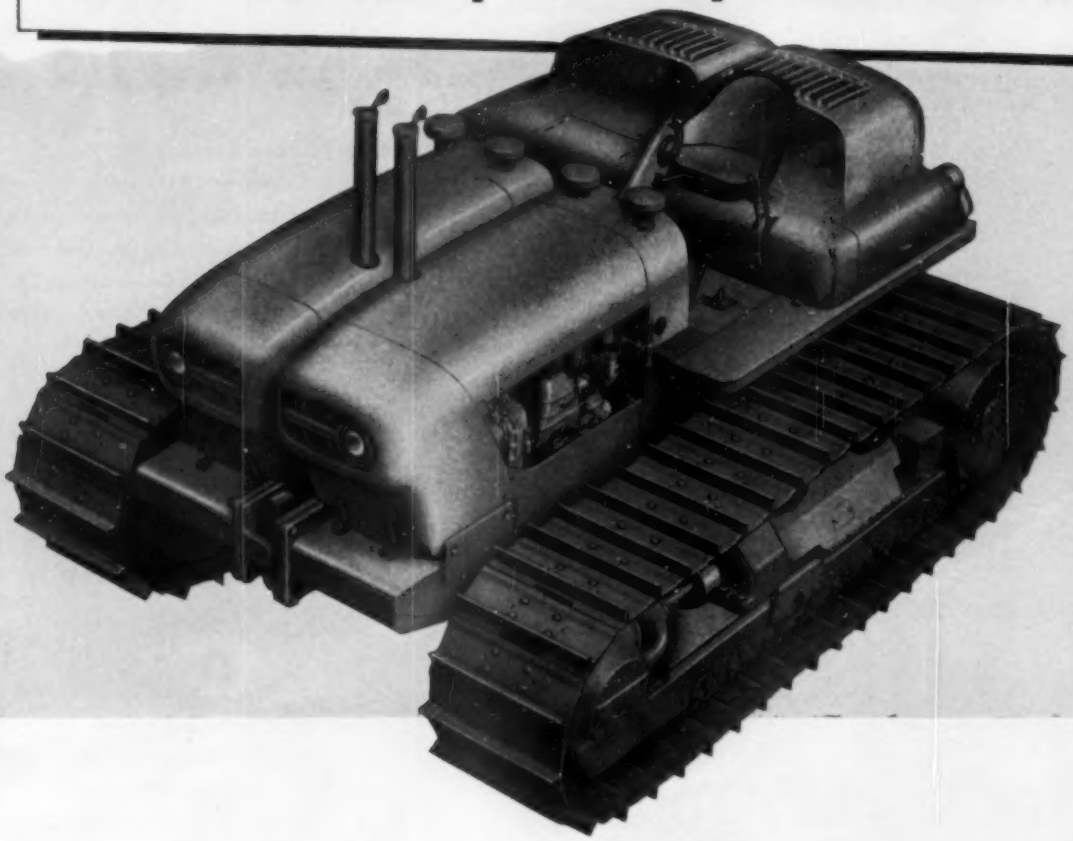
G-15-ICG

NORTHWEST

SHOVELS • CRANES • DRAGLINES • PULLSHOVELS

NOW THE Euclid TC-12 GIVES YOU

more horsepower . . . more track area . . . more accessibility than any other crawler!



Ever since it was introduced more than a year and a half ago, the Euclid TC-12 Tractor has set completely new standards of crawler production and performance. It has proved, on job after job, that it is years ahead of the field in ability to do more work—faster, easier and cheaper. Now the TC-12 has even more power to handle the biggest tractor jobs.

Powered by two 218 h.p. engines with separate Torqmatic Drives for each track, there's a total of 436 horsepower. Big 27" standard shoes and 8 track rollers give good balance with the additional horsepower, heavy duty dozer blades and other attachments.

This new TC-12 Crawler has many other improvements that put it even further ahead of other tractors . . . in performance, ease of operation, maneuverability and service accessibility. Ask your Euclid dealer to prove that the TC-12 has no equal for big tractor jobs and have him show you why *Euclids are your best investment.*

EUCLID DIVISION GENERAL MOTORS CORPORATION, Cleveland 17, Ohio

Euclid Equipment

FOR MOVING EARTH, ROCK, COAL AND ORE

20% MORE WORK-ABILITY

Euclid "Twins"—the TC-12 Tractor and Twin-Power Scraper—will move the cheapest dirt on the big road program or on any earthmoving job. They can set new production records at lower cost on your operations.

The Euclid TC-12 has exceptional maneuverability because each track has a separate power train. Operator has excellent visibility and "hair trigger" control of steering in any of the three speed ranges, forward or reverse.

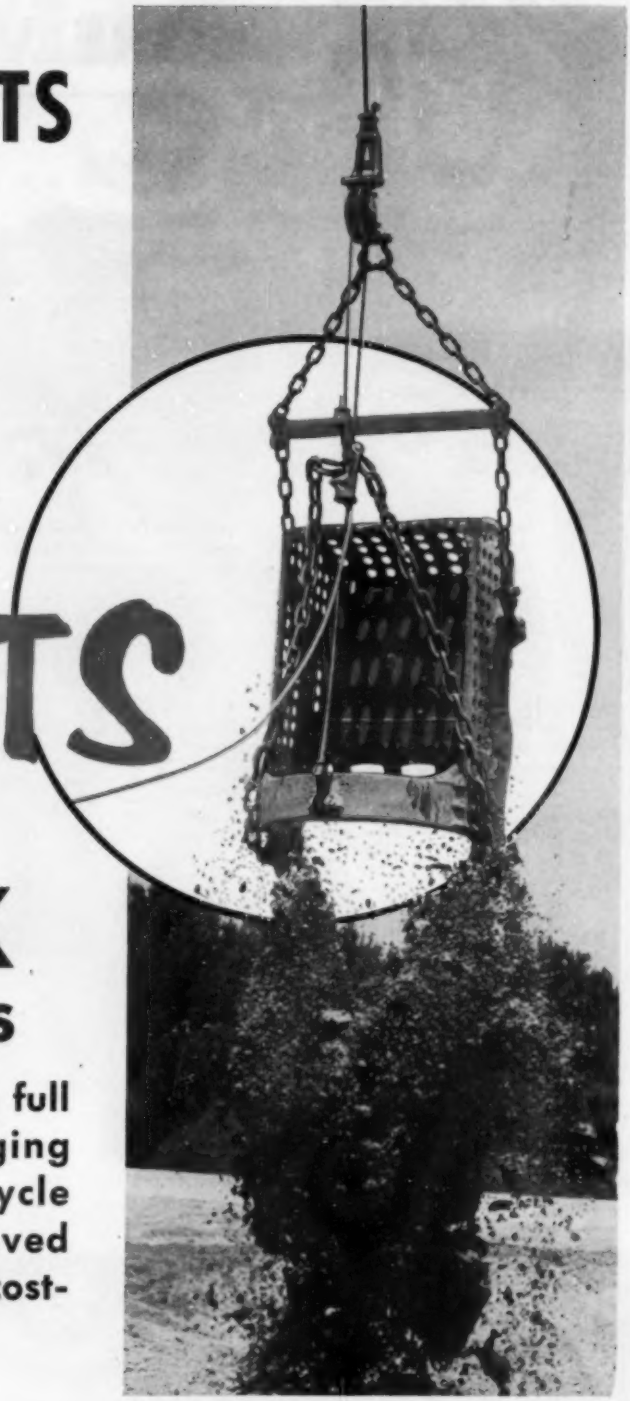
With separate Torqmatic Drive for each big track, the TC-12 is fast on its feet, with plenty of power and traction for any big tractor job. It has proved its ability to outwork any other tractor on dozing, clearing, push-loading scrapers and pulling big equipment.

A high production machine, the TC-12 is easy to operate—delivers more push-pull drawbar horsepower at high travel speeds. Unitized assemblies and easy accessibility of major components permit servicing without major tear-down of other parts.

For push-loading big scrapers the Twin-Power "Euc" crawler has no equal. Torqmatic Drive provides a smooth, steady flow of power—changes from one speed range to another and from forward to reverse are made under full power.

EMPTY BUCKETS CAN MEAN...

MORE PROFITS



HENDRIX
DRAGLINE BUCKETS

...DUMP CLEANER allowing a full load capacity on every digging cycle. A full bucket every cycle results in more material moved in less time for the lowest "cost-per-yard."

Hendrix Lightweight Dragline Buckets

A TYPE FOR EVERY DIGGING PURPOSE

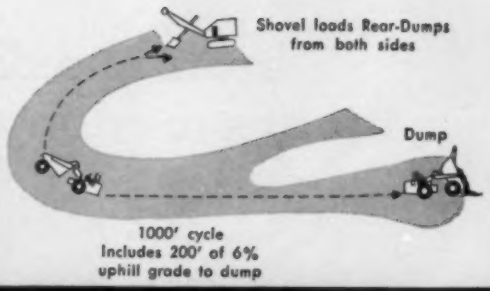
¼ to 40 Cubic Yards

All Hendrix Buckets available without perforations

HENDRIX MANUFACTURING COMPANY, Inc.

MANSFIELD, LOUISIANA

Haul heaped loads over slippery clay footing at Georgia Coating Clay Co. Pit



Within the year, Georgia Coating Clay Co. will produce 90,000 tons of kaolin at Pit #5 — one of their 5 mines in the Macon, Ga., area.

At this pit, 11 miles east of Macon, a 1½-yd. Koehring shovel and two 11-ton D Tournapull Rear-Dumps are stripping a 25′ layer of sand and red clay to expose rich kaolin deposits.

Hauls 7 yds. per load

Shovel operator heaped 7 yds. of overburden into Rear-Dump's wide (5′ 10½″) bowl in 1 min., 7 sec. Although rains made clay haul roads wet and sticky, each Rear-Dump consistently hauled heavy loads 500′ to dump site in average of 1 min., 24 sec. Haul included 200′ of 6% uphill grade out of the pit. On the dump, "D" backed in, spotted and dumped in 8 sec. Then, it pulled away and returned over same, slippery haul road to complete 1000′ cycle in average of 3 min., 49 sec.

According to Mine Supt. Frank Fountain, when clay road was dry, Tournapull Rear-Dumps cut cycle time to 3 minutes . . . increased production at the pit by one-third.

"Outstanding in rock"

Tournapull Rear-Dumps were moved to this tough stripping assignment, at Pit #5, after they profitably stripped 90′ overburden at Georgia Coating's other pits. Fountain said, "We were in trouble at this pit until we got these Rear-Dumps, and they brought us out. They did outstanding work in both tough rock and 'water sand'. I like 'em 'cause they're easy to maneuver under a shovel. They can pull themselves out of the soft dumps easy, too."

"D" scraper . . . valuable pit tool

Georgia Coating also uses a D Tournapull scraper on exploratory stripping operations. Besides stripping, versatile "D" loads, hauls and spreads sandy topsoil over the slick clay haul roads to speed hauling operations.

3 sizes; interchangeable work units

Tournapull Rear-Dumps are available in 3 sizes: 11, 22, and 35 tons. All can be interchanged with other trail units for year-round specialized work. Call or write for full specifications.

At a flip of a switch, operator activates electric switch to raise Rear-Dump body into dump position. Streamlined bowl sheds material fast. Note exposed kaolin in background.

Stripping 25′ overburden, shovel operator easily heaps good load into Tournapull Rear-Dump. Low rear-entry permits quick swing-out of empty dipper with door open.

D Tournapull scraper self-loads, hauls, and spreads topsoil over sticky roads to provide more traction for haulers . . . handles variety of pit jobs including exploratory mining.

Tournapull—Trademark Reg. U.S. Pat. Off. DRDP-1059-Q-b

LeTourneau-WESTINGHOUSE Company, PEORIA, ILLINOIS

A Subsidiary of Westinghouse Air Brake Company

WHERE QUALITY IS A HABIT

KEEP COSTS DOWN *with help like this . . .*

- **TORQUE CONVERTER DRIVE . . . matches power and speed to job requirements automatically . . . cushions entire power train**
- **1,000-HOUR LUBRICATION INTERVALS for truck wheels . . . eliminate daily greasing . . . convert service time to profit time**
- **ONE-PIECE STEERING CLUTCH AND FINAL DRIVE HOUSING . . . insures perfect alignment, low maintenance, long life**
- **UNIT CONSTRUCTION . . . makes major service simple, fast**
- **ALL-STEEL BOX-A MAIN FRAME . . . provides full-length protection**

All pioneered and proved by Allis-Chalmers . . . five of dozens of basic advantages that can help you bid lower . . . get more jobs . . . make a profit when you're through. Now is the time to have them working for you. Allis-Chalmers, Construction Machinery Division, Milwaukee 1, Wisconsin.

ALLIS-CHALMERS *Engineering in Action*

6 ways Bucyrus-Erie Excavators SAVE you money to MAKE you more money

This ¾-yd. 22-B loads dirt and rock fill for a turnpike extension in Pennsylvania.

It isn't just through their extra output ability that Bucyrus-Erie excavators help you make money. They *save* you money in many ways, thus adding to your profits.

1 Save downtime. Cold, hard figures kept by users show that a Bucyrus-Erie stays on the job more hours, helps get the maximum work out of companion equipment.

2 Cost less to maintain. There are actually fewer parts in a Bucyrus-Erie excavator to wear out, and they are built to last — which adds up to lower cost maintenance.

3 Save fuel. Elimination of deadweight through proper design means less power wasted swinging useless metal. Smooth, direct flow of power means more of it doing useful work.

4 Cut conversion time. It's easy to convert from one front end to another. Quick convertibility gives you wider use of your machine, too.

5 Service faster. Many grease fittings are grouped at central, easily accessible points. Adjustments are easy to make — and "stay put."

6 Last longer. It's a tradition in the excavator field that Bucyrus-Eries outlast other makes, cutting your depreciation and replacement costs.

These and other savings add significantly to the profits from Bucyrus-Erie excavators. Why not learn the whole Bucyrus-Erie profit story — see your distributor or write direct for more information. 316E57C

BUCYRUS ERIE

SOUTH MILWAUKEE, WISCONSIN

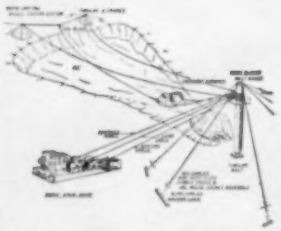
Cut Materials Handling Costs . . . Dig *and Haul* In One Operation With A SAUERMAN MACHINE

Digging and hauling are reduced to one continuous operation by using either a Sauerman DragScraper or Slackline Cableway. By combining the two basic steps of material flow, equipment and labor costs are halved—or even more. A single machine, controlled by one man, does the same job as the multiple equipment required by other methods.

Profitable handling is further assured by a low maintenance cost of 1½ cents per cu. yd. for an average size installation. Larger machines drop this cost still lower. Important, too, is the money saved on power. You pay only the cost of moving the actual digging tool—the Crescent DragScraper or Slackline bucket. Heavy machines with limited handling-to-dead weight capacity are eliminated.

General Handling, Wet or Dry— Pit or Hill Excavation and Reclamation

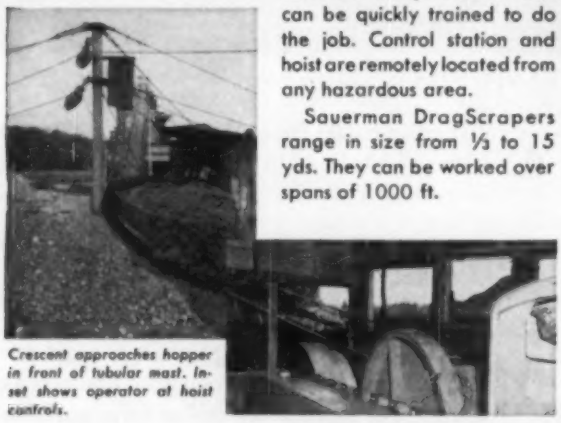
3-yd. DragScraper digs and hauls sand and gravel from pit to plant hopper over a distance of 400 ft.



A DragScraper is recommended for these and similar jobs. This machine handles the toughest digging and operates on a hillside or underwater with as much facility as dry level ground. It hauls directly to hopper, crusher or storage pile.

Operation is simple and safe. An inexperienced man can be quickly trained to do the job. Control station and hoist are remotely located from any hazardous area.

Sauerman DragScrapers range in size from ⅓ to 15 yds. They can be worked over spans of 1000 ft.



Crescent approaches hopper in front of tubular mast. Inset shows operator at hoist controls.

Deep Digging, Underwater Recovery— Conveying to High Delivery Point

This 1½-yd. Slackline Cableway is digging in 70 ft. of water and conveying to stockpile on an average haul of 600 ft.

When deep digging is required—or anticipated in the future—a Sauerman Slackline Cableway is the best machine. This powerful excavator can dig 100 ft. or more below water, lift its load and deliver to a high pile up to 1000 ft. away. This surge pile can be held in readiness for plant needs.

The bucket inhauls at high speed and dumps automatically. The dumping point is determined by a stop button on the track cable. Gravity returns the bucket to the digging point completing the fast operating cycle.

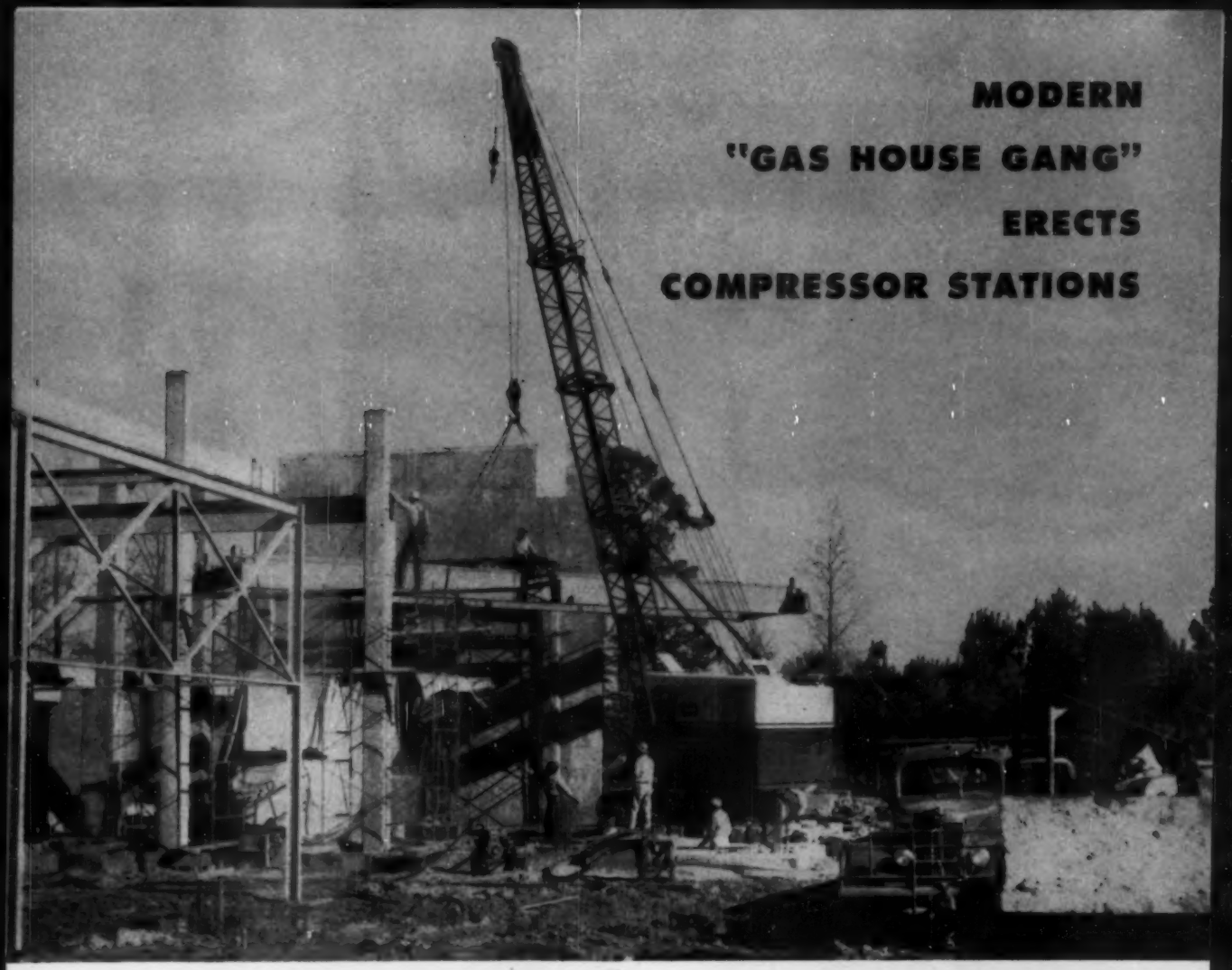
Sauerman Slackline Cableways range in size from ⅓ to 3½ cu. yds. Now available with torque convertor power, the Slackline is increasing its production over 25%.

Bucket automatically discharges onto a 60-ft. high cone pile. Mast in foreground rises 90 ft.

The best Sauerman Machine for your plant is governed by the nature of the deposit, location of material, the depth and plant layout. Why not consult Sauerman engineers about your plant? Their recommendations will be based on almost fifty years of sand and gravel excavating machinery experience. Ask for Catalog A (DragScrapers) and C (Slackline Cableways).

SAUERMAN BROS. INC. 622 SOUTH 28TH AVENUE • BELLWOOD, ILLINOIS

CRESCENT SCRAPERS • SLACKLINE and TAUTLINE CABLEWAYS • DUROCITE BLOCKS



MODERN "GAS HOUSE GANG" ERECTS COMPRESSOR STATIONS

A "gang" of Marion 35-M cranes is helping J. F. Prichard & Co. of Kansas City rush construction of four new compressor stations on a Gulf Interstate Gas Company transmission line.

The 30-inch line originates in southern Louisiana and terminates in Kentucky, where the gas is distributed to customers in Kentucky, West Virginia and Ohio. The new stations are strategically located to add about 20,000 compressor horsepower on the main line to help stabilize pressure when extreme loads are thrown on the line during winter months.

Modern design tilt-up construction of the stations means many maximum lifts for the Marions, and these sturdy 18-ton cranes are meeting the challenges of the job without a strain. The work also requires fast front end conversion from crane to clamshell to dragline. Since the Marions convert without machinery changes, construction of the stations has moved at a fast pace.

Fast-acting, easy to operate Marionair Controls have proved valuable on the many precision lifts needed to install heavy and expensive machinery in each station.

Your Marion distributor will be glad to explain how a gang of husky 35-Ms could bear the brunt of your work load. Contact him today!

Whatever your job requirement, there is a Marion machine of the right size and type for greatest efficiency

Machine	Shovel Cap. in Cu. Yds.	Hoe Cap. in Cu. Yds.	CRANE RATINGS Crawler Mount Max.* Stability	Crawler Mount Max. Usable	Truck Mount Max. Usable	Ask For Bulletin No.
MARION 35-M	¾	¾	18T @ 10'	18T @ 10'	25T @ 15'	431
MARION 43-M	1	1-1¼	27T @ 10'	20T @ 12'	36T @ 15'	430
MARION 362	1½	1½-2	43T @ 12'	30T @ 15'		398-D
MARION 87-M	Special Crane		150T @ 12'	75T @ 15'		—
MARION 93-M	2½	—	80T @ 12'	50T @ 15'		397-F
MARION 101-M	3	—	84T @ 12'	57T @ 15'		417-A
MARION 111-M	4	—	169T @ 12'	106T @ 15'		402-C

*For Comparison Purposes Only

MARION POWER SHOVEL CO.

MARION *Marion, Ohio, U. S. A.*

Please send me bulletin No. 431 on the Marion 35-M.

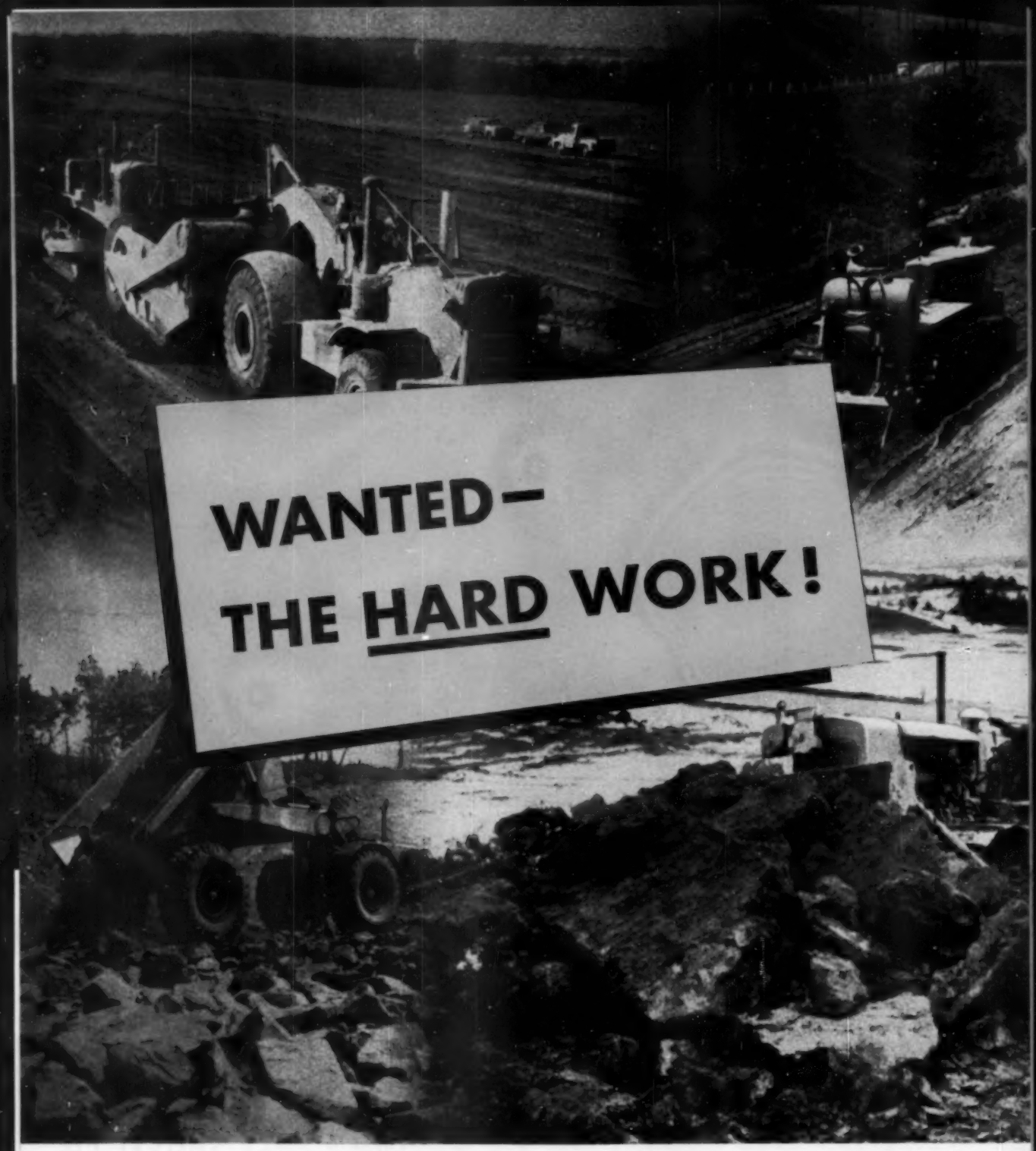
Name _____ Title _____

Company _____

Address _____

City _____ State _____

(130)



It's the hard work that separates the "men" from the "boys" in construction equipment. Faced with their greatest construction challenge in history—the 41,000-mile Interstate Highway System—contractors must depend on "men" if they are to get the job done profitably, and get it done on time.

Any machine can do a passable job when the going is easy. But this challenge involves *hard work* . . . the kind that tests the ability of equipment to produce. That's the kind of work that made Caterpillar-built machines the leading equipment used by contractors. CAT® units are designed and built for money-making performance under the toughest conditions. Where the going is roughest, Caterpillar

equipment gets and handles the job. Got some hard work to be done? Give it to the machines that want it, like it and can do it profitably for you—Caterpillar-built machines!

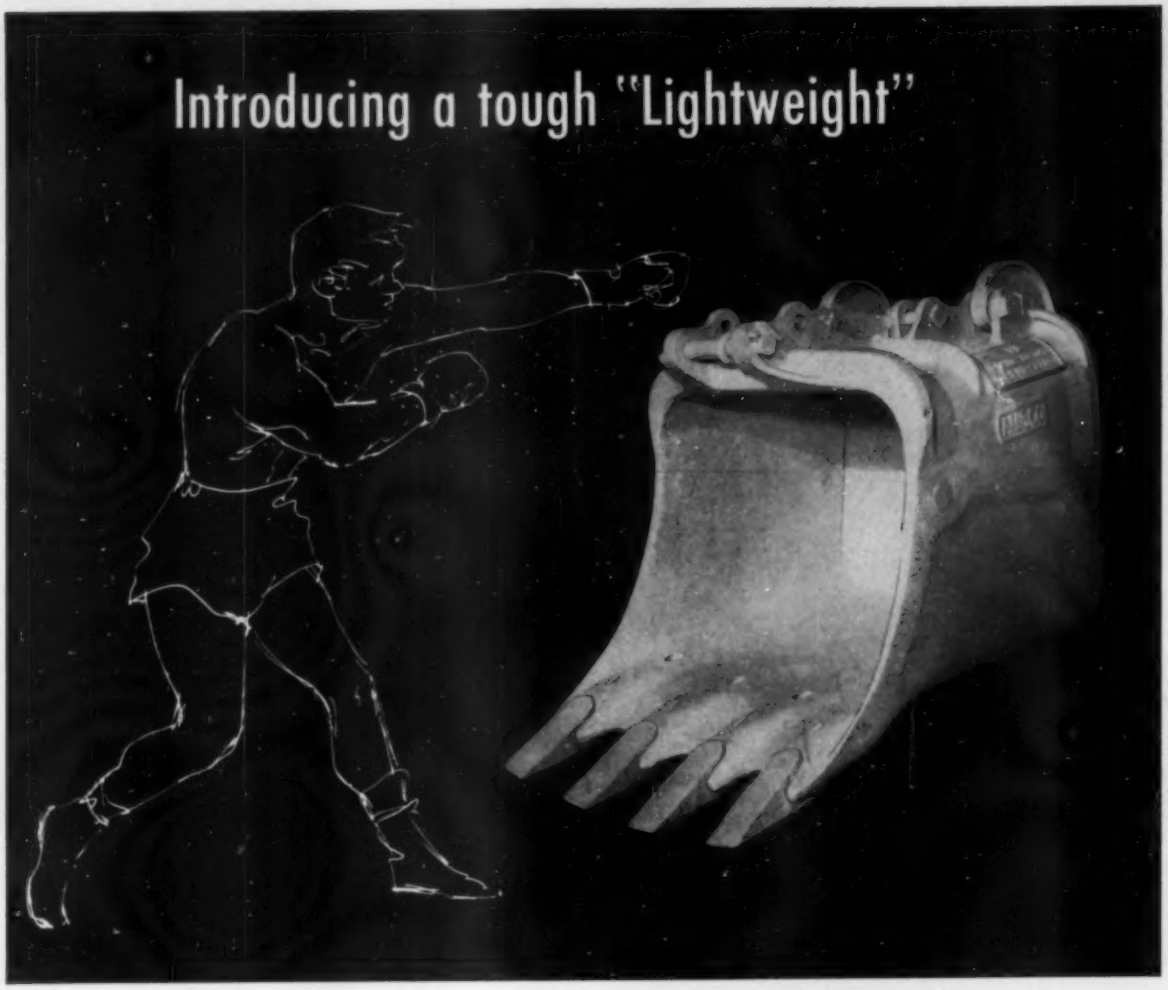
Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

DIESEL ENGINES • TRACTORS • MOTOR GRADERS • EARTHMOVING EQUIPMENT

CATERPILLAR*

*Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

HEAVY-DUTY MACHINES FOR THE HARD WORK



NEW Amsco® Manganese Steel LIGHTWEIGHT DIPPER

Rugged 3/4 yd. dipper, made of the "toughest steel known," actually work-hardens under impact

Those big, tough Amsco Dippers now have a smaller brother. With this new, rugged, lightweight dipper, small shovel operators can enjoy the combined advantages of long-wearing manganese steel and proved Amsco design features, such as:

- One-piece manganese steel back castings
- Arch formed by complete box section for maximum strength
- Teeth are set for clean, fast digging
- Interior is designed for rapid dumping
- Lugs for handle, back, and braces are cast integral with back—for extra strength
- 25% lighter than standard Amsco 3/4 yd. dipper, permitting use on light-duty shovels and allowing their developed power to be more fully utilized
- Curved door in back, for full-capacity loading with each pass

Ask your shovel manufacturer for full information—or write us direct for descriptive literature.

"Vital Statistics" on this new lightweight champ

Height of front over teeth	4 ft. 5/8 in.
Height of back	2 ft. 7 in.
Opening at top	2 ft. 5 in.
Opening at bottom	2 ft. 7 in.
Approximate weight	1550 lbs.

AMERICAN Brake Shoe COMPANY

AMSCO

American Manganese Steel Division • Chicago Heights, Ill.

OTHER PLANTS IN: DENVER, LOS ANGELES, NEW CASTLE, DELAWARE, OAKLAND, ST. LOUIS, JOLIETTE, QUEBEC

San Andreas, California . . .

another example of the cost-cutting features that bring repeat orders for Bucyrus-Erie rotaries

On the strength of the performance records of a Bucyrus-Erie 50-R rotary blast hole drill placed in operation in 1954, the Calaveras Cement Company recently installed a new Bucyrus-Erie 40-R drill at its No. 1 quarry near San Andreas, Calif.

The 40-R is drilling 9-in. holes through limestone to an average depth of 70 feet. Even though this rig has been operating only a short time, the drill operator reports the 40-R is "doing a fine job." Calaveras Cement is believed to be the first cement company in the West to convert completely to rotaries — all Bucyrus-Erie.

Among the many reasons for the outstanding success of these drills are: rotary drive with Ward Leonard electric control of rotating speed; hydraulically powered pulldown force; remote-controlled power-driven tool handling unit; and air blast cleaning of drill holes.

Two models are available — the 40-R for drilling 6¾- to 9-in. holes, and the 50-R for drilling 9⅞- to 12¼-in. holes. Holes can be drilled continuously for 32 ft. 9 in. (50-R) and 27 ft. 9 in. (40-R) before an additional pipe section has to be added.

Bucyrus-Erie rotaries can speed your drilling operations . . . cut your drilling costs. Write direct for detailed, illustrated literature.

51B57C

BUCYRUS ERIE

SOUTH MILWAUKEE, WISCONSIN

Excavating Engineer
founded 1905 FEBRUARY, 1957

Bhakra dam's 5,400,000 cubic yards of concrete will dam a deep, precipitous canyon of the Sutlej River, a swift mountain stream.

India Builds Gigantic High Dam

by Ray Day

"BHAKRA is the toughest project ever built."

Just seven words. Spoken by Harvey Slocum, a man acknowledged to be the world's outstanding dam builder, they sum up the unbelievable difficulty of building a 1960-model irrigation project in a land where modern construction technology is still new.

When Slocum says Bhakra is the toughest of them all, he's comparing it with Grand Coulee, Bull Shoals, Friant, and 15 other massive United States dams whose construction he has directed. A few heads of American contracting firms who visited the Bhakra job have come away awed at its magnitude.

The Indian government is doing the job with Indian labor, Indian engineers, and its own resources. An overall consulting board, including some of the great names in U. S. dam engineering, helped to draw up a conception of the project. And Slocum, together with about 30 other Americans, have pooled their construction and engineering know-how to advise and generally direct the coordination of operations. Aside from that, it's an Indian show.

Patterned after great American irrigation projects like the one in the Columbia River basin or the Lower Colorado River system, Bhakra is a colossal job. Everybody — Indians and Americans alike — recognizes it. How would you like, for example, to direct a job with these problems:

1. Most of the equipment, materials and spare parts would have to come to your job from outside the country. As a result you would have to plan for a minimum delay of at least 9 months from the time you placed your order

Comparable to Grand Coulee, India's Bhakra dam takes shape under difficult construction problems. With a height of 760 feet, it will be world's highest straight gravity concrete barrier.

until your shipment arrived. You would face the cruel choice of carrying an inordinately large warehouse of stock, which would mean finishing the project with a lot of excess supplies, or of being out of material most of the time. Which would you do?

2. To get 60% of normal equipment production as we know it in the United States, you would be forced to use exactly twice as many trucks, shovels, cranes, and other pieces of equipment. Because of inexperienced labor and equipment repair difficulties, you would have to content yourself with a production rate of 30 cubic yards per hour per cubic yard of dipper capacity when all your life you had gotten twice that much from your power shovels in the United States.

3. Because of centuries-old customs and transportation difficulties, it would take you an average of 30 days to move a freight car 1,200 miles.

4. Because of various long-established holidays, you would get a less-than-average number of working days per year.

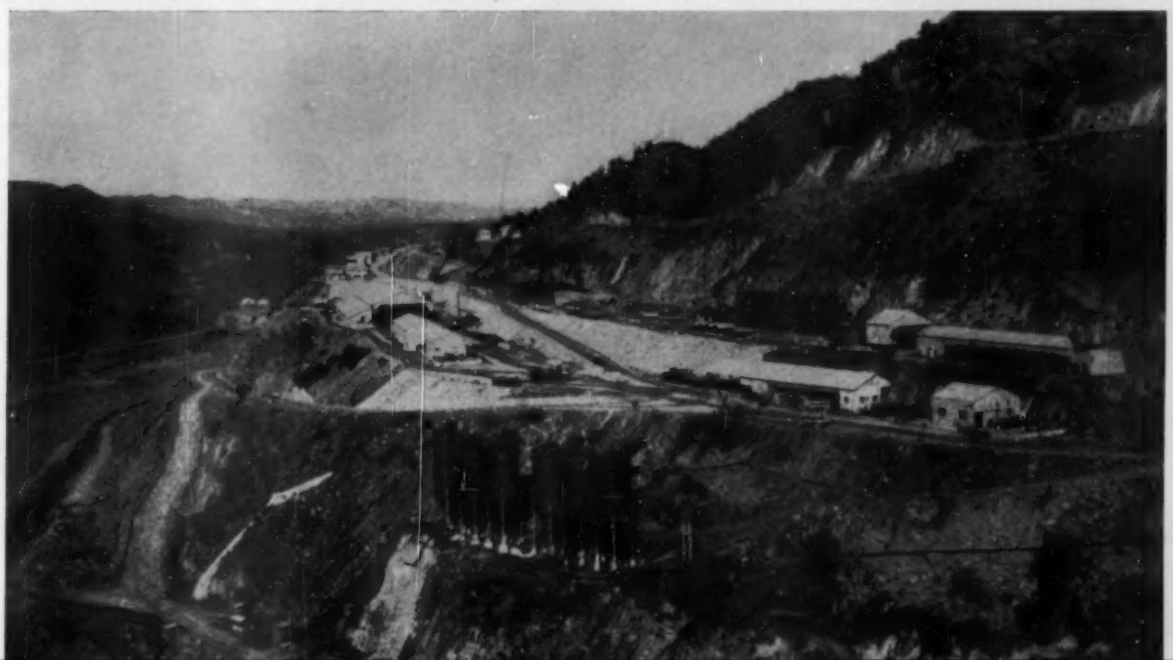
5. No pool of experienced labor would be open to you. Skilled equipment operators and experienced mechanics would not exist. No lumber yards would be available to you . . . you would have to erect your own sawmill and contract for logging to produce what timbers you needed.

6. And yet, the dam you were charged with building would be the world's highest straight gravity section ever built, by a big margin. Its 5,400,000 cubic yards of concrete would dam a stream the size of the Colorado in a canyon so steep, so precipitous that your haul roads would have to be cut around the tops of 250-ft. cliffs. And flat places where you could make administrative headquarters, storage yards, repair headquarters and all the other things you needed would simply be nonexistent. You'd have to make them yourself.

Veteran dam builder Harvey Slocum shows India's Prime Minister Nehru and his party how a conveyor system will bring aggregates to the Bhakra dam site.

It was this brutal combination of practically unbeatable problems which somehow appealed to Slocum's sense of drama. With nearly half a century of dam building behind him and at an age when most men are content to take things a little easier, the little guy who built some of the greatest dams the

Difficulty of setting up concrete materials plant at Bhakra dam is shown in this view. Site had to be carved out of mountain side.



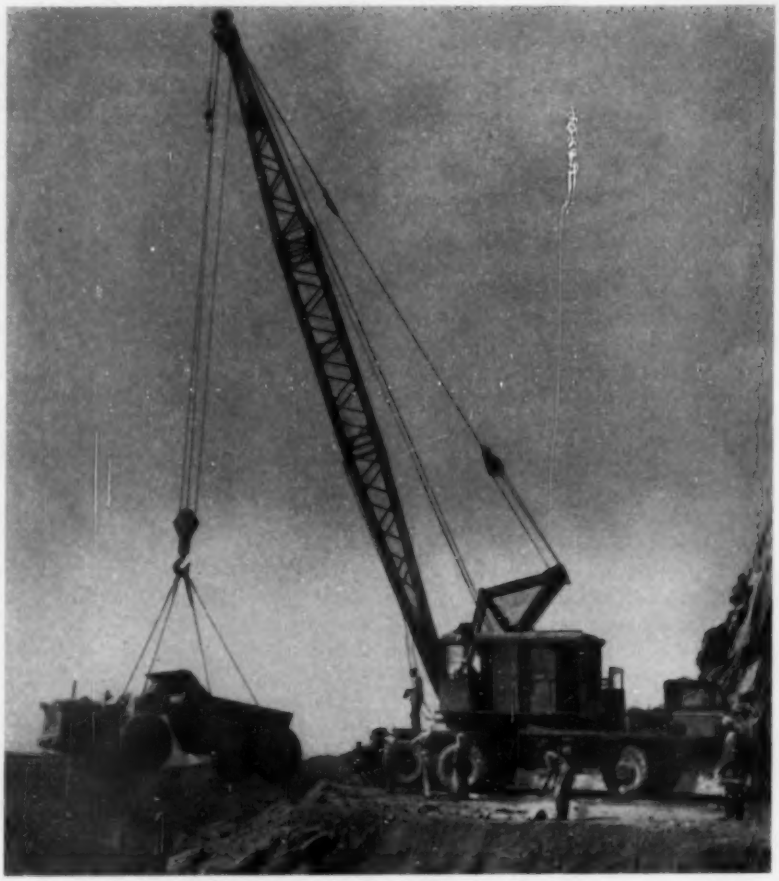
world has known has taken on Bhakra. And, while so engaged, he finds time somehow to commute three times a year between India and his home in Alhambra, Calif., to make an inspection trip or two to various projects around the world, and to practice wide general interests. When Nikita Krushchev of the Soviet Union recently toured the Bhakra project with Premier Nikolai Bulganin, both men viewed with admiration what the Indians had accomplished with Slocum's help.

Important to Economy

Although Bhakra is but one project, there is every likelihood that it will change India's economy dramatically for the better. India has an industrial steel capacity of only 7 pounds per person per year, for example. We have 1,300 pounds per person here in the United States, thanks mostly to industrialization that electric power has made possible.

Bhakra's hydroelectric power will be at least 50% cheaper than any electricity India ever had before. One example of how that country's economy already is changing is that a new fertilizer plant near Nangal will use nearly 200,000 kilowatts of the dam's hydroelectric production.

Bhakra dams India's Sutlej River—a wild, unruly stream with a mountain gradient so steep (about 10 feet per



(Above) LeTourneau-Westinghouse Tournarocker is lowered to a work area by a Lorain crane. (Below) A 120-RB 5-yd. electric shovel strips rock from dam abutment.

Upstream cofferdam rises as trucks haul in material stripped from dam's foundation. It will be India's highest earthfill structure.

mile) that peak floods last only 5 to 6 hours, instead of days or weeks. The biggest definitely known flood carried 276,000 cfs a few years ago. Legend says there was a 390,000-cfs flood in 1876, but Slocum is skeptical about the accuracy of that figure.

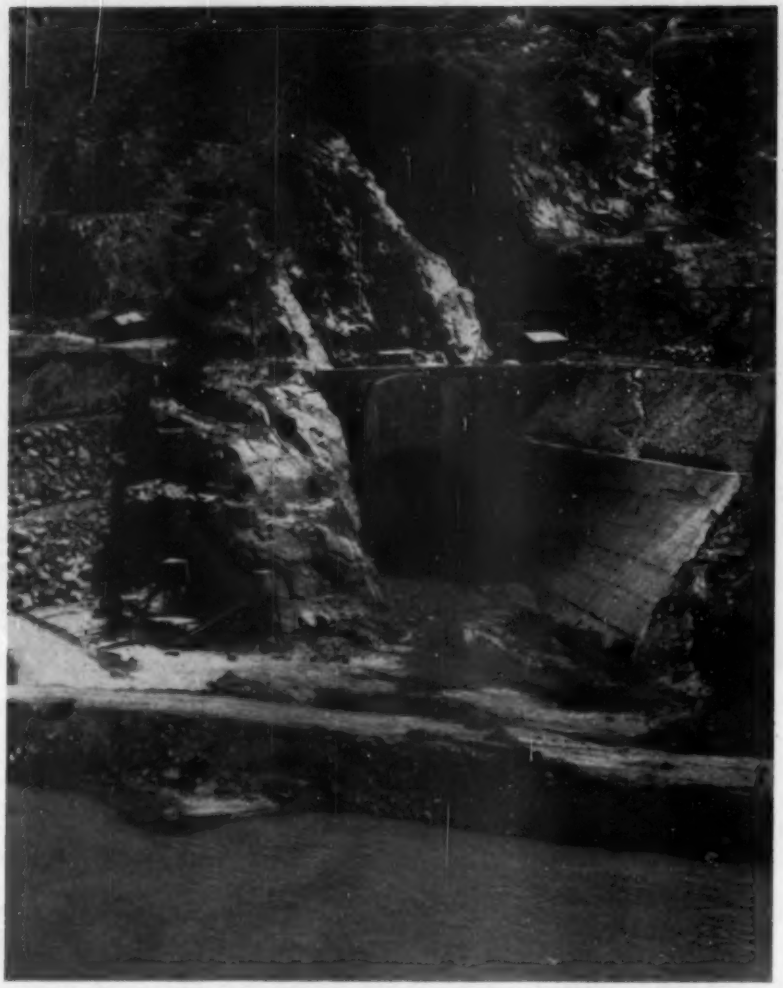
The project is located 220 miles north of Delhi in a narrow canyon in the foothills of the Himalayas known as the Siwalak hills. The dam, hydroelectric facilities and a network of canals will cost an estimated $357 million.

The dam now under construction is 1,700 feet long at its top, rises 760 feet above stream bed, and has a base width of 650 feet at the widest point. Originally planned for 400-ft. height because engineering consultants were afraid of the foundation, the dam's height gradually has been increased to the present 760-ft. level. If another 50 feet of height could be added, it would double the reservoir storage and furnish reserve incoming silt storage capacity. But that matter has not been finally decided, pending complete foundation studies. It looks now like a minimum of 760 feet.

The 5,400,000 cubic yard concrete barrier will be the highest straight gravity section ever built. Bhakra's spillway will be a 260-ft. wide overflow type, with a long apron, and a controllable crest with four tainter gates whose tops come to Elevation 1680. Elevation of the spillway lip is 1645. Elevation of the foundation is 940; of the dam's top, 1,700.

Maximum power capacity is now calculated at 930,000 kilowatts with 10 generators, but not all this will be firm power. Only about 630,000 kilowatts can be expected on a firm basis. Additional power capacity is expected to be developed at Gunguwal, about 14 miles below Bhakra dam and approximately 11 miles below Nangal diversion dam,

Earthfill for the downstream cofferdam is graded by a Cat dozer and compacted by tractor-drawn sheepsfoot rollers. Hard labor is used again to pick rocks from the fill.



(Above) Here is outlet of a 50-ft. diameter diversion tunnel which is 2,500 feet long. (Below) A 2½-yd. Bucyrus-Erie 54-B dragline digs a diversion channel for the river.

which trains Sutlej River into irrigation-canal works. There will be a 96-ft. head power drop here. Another 96-ft. head will also be developed in 8 more miles at Kotla powerhouse.

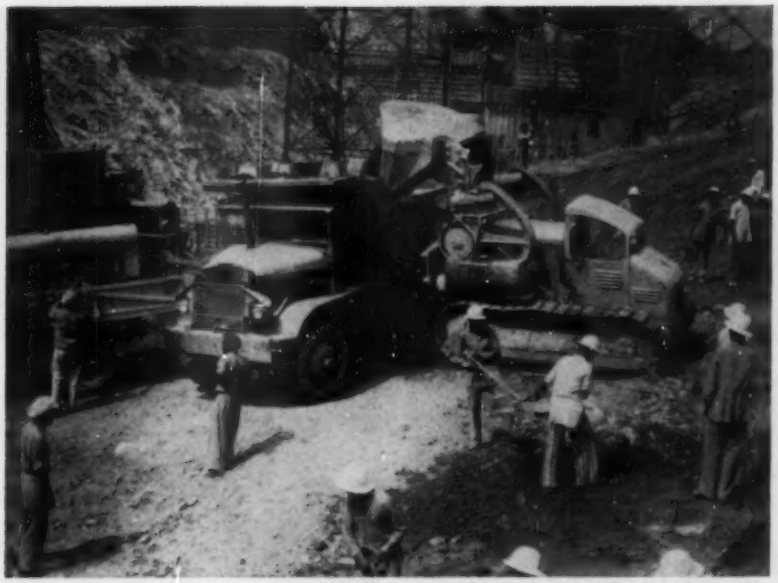
Literally hundreds of miles of irrigation canals are included in the Bhakra project, starting off with a main canal whose Q-factor, or carrying capacity, is 12,500 cfs. Originally Bhakra was planned wholly as an irrigation project until the desirable factors of hydroelectric power production emerged. Bhakra is one of the world's most efficient irrigation projects, as a matter of fact. Compared to our own 1,200,000-acre Columbia basin project, which is our biggest, Bhakra will put under irrigation 3,500,000 acres of land in semi-desert areas of Punjab, Pepsu and Rajasthan states in northwest India. And because Bhakra's delivery system can run by gravity, no elaborate pumps will be necessary. Actually, Bhakra will put closer to 6,500,000 acres of new land under cultivation, but because the climate there is about like central Arizona, half the irrigable acreage will lie fallow in alternate years. Reservoir storage capacity of 7,500,000 acre feet of water is expected to give a dependable, ample reserve of water to these thirsty acres . . . and to spin the humming generators while it passes through the powerhouses.

Difficult Stripping Job

Stripping of both abutments and the dam foundation in the steep-walled Sutlej River gorge has been a slow, time-consuming business. It was so difficult an excavation job that Slocum, in order to divert the river through a pair of 50-ft. diameter tunnels 2,500 feet long at a favorable time, had to leave part of the upper abutment stripping and concentrate on that farther down, nearer to the river.

Main idea of stripping is to get all the loose, objectionable material cleaned off to expose Bhakra's two types of parent foundation rock—claystone and sandstone. Both types are sedimentary. The Bhakra site at the base of the Himalayas has been raised sharply by geologic uplift, and the claystone seams lie almost on edge with the strike being upstream. There are four principal claystone strata —ranging from a few feet to 300 feet wide—between the upstream end of the dam and the end of the spillway. The sandstone rock also has been heavily folded and lifted.

What the engineering consulting



An Eimco tractor loader cleans up around a concrete pour area. About 120,000 cubic yards are being placed per month, although the concrete plant can supply more.

board was worrying about was whether these two somewhat dissimilar materials would behave the same under Bhakra's heavy concrete load. Slocum has always said they will, and the consensus now agrees with this point of view.

When Slocum arrived in India, he did a preparedness job in his own typical way. He prepared for work by getting haul roads built and all-weather work areas set up. The haul road job alone was enormous, and called for both earth and rock excavation. Also, while Slocum was building his most recent United States dam—Bull Shoals in Arkansas—Indian crews were busy boring the diversion tunnels. Under the contemplated present head, these tunnels will carry about 107,000 cfs each. With the cofferdam at its final height, they will carry about 225,000 cfs.

Since electric power had to be developed at the site, a 5000-kw steam-driven plant was set up, along with 2,400 kilowatts of diesel electric capacity in the form of Enterprise diesels with General Electric generators. A dozen 1000-cfm Chicago Pneumatic air compressors, driven by 250-hp GE motors, also were installed to deliver the necessary air capacity.

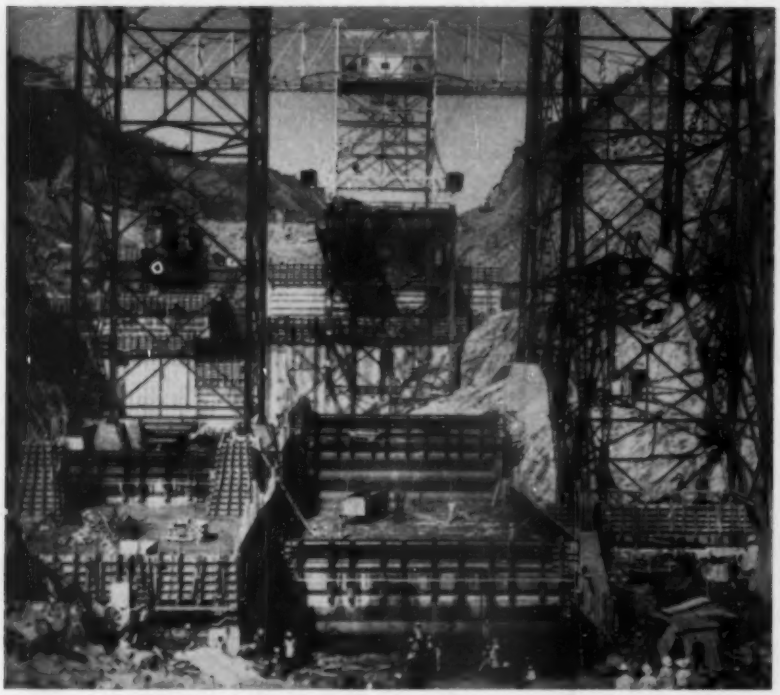
With the stage all set, foundation stripping began in earnest in 1953. Using hydraulic sluicing monitors on each abutment and starting from the top, men cleaned the overburden away with a blast of water lifted over 400 feet by 1500-gpm pumps. Then Slocum put a pair of Bucyrus-Erie 54-B shovels, a 120-RB Ruston-Bucyrus and five Marion 93-M shovels on the abutments at Elevation 1450, so that the stripped material could be used for building diversion cofferdams. If the cofferdams could be built in time to divert late in 1954, Slocum could clean off the foundation and get concrete started about a year earlier than he had dared to hope.

With Caterpillar and International bulldozers keeping the area clean, the shovels loaded Euclids with stripped material. A downstream cofferdam 140 feet high was built, with its base at Elevation 1075. There was a short period of trouble when foundation borings here proved to be about 30 feet in error, so that excess excavation had to be taken out to get the cofferdam down to bedrock. In October, 1954, the river was down to 18,000 cfs and Slocum decided to gamble. Making a temporary diversion quickly, he set crews to work excavating down to Elevation 1090 to get solid footing for his permanent upstream cofferdam.

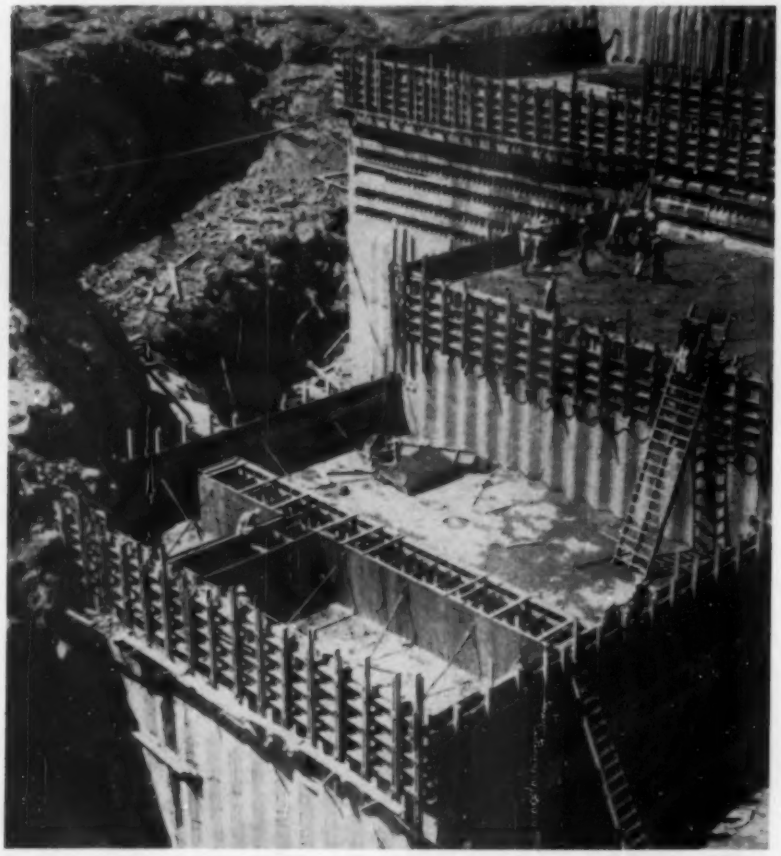
Build Earth Cofferdam

By January 1955, equipment had started in with the impervious clay for this barrier. Less than three month later the cofferdam was finished. It had taken less than six months to excavate to bedrock and rebuild the cofferdam back to original height. About 20 feet in elevation was added since, as a safety measure, to prevent floods from overtopping foundation stripping and early concrete

Cranes working on steel trestles place concrete. Unit shown is an American revolver. Concrete is supplied by locomotive cars carrying four Blaw-Knox 4-yd. buckets.



All concrete is placed in 6-ft. lifts. Minimum time intervals between lifts is 72 hours. Note steel trestles for cranes are permanently embedded in dam's foundations.



Steel forms fabricated on the job according to Blaw-Knox designs are used to shape mass concrete. Forms are raised by ratchet-lever chain hoists and A-frames.

operations. The upstream cofferdam, built 235 feet high, is the highest earth-fill in India.

Equipment used on this foundation and abutment stripping included a Ruston-Bucyrus 120-RB shovel, two Bucyrus-Erie 38-B shovels with 1½-yd. dippers, and a pair of Bucyrus-Erie 54-B's. Five Marion 93-M shovels built access roads, worked on the main excavation, and loaded out material from tunnel bores. There were two ¾-yd. Lorains which were used for slide maintenance on the access roads, and one Lorain 80-J shovel for general utility use. Hauling equipment included approximately 100 Euclids in three sizes,

Spectacular night shot, taken looking upstream, shows concreting under floodlights. Batching and mixing plant is at upper left.

of which about 60 worked on the dam stripping. Twenty of the Eucs were 16½-yd. machines; eight had 6.6-yd. capacity; and the remainder were 10-yd. rigs. Ingersoll-Rand jackhammers and wagon drills were used almost entirely, with Carset bits, for drilling when that was necessary.

To get the remaining stripping, which had to be left high up on the abutments, Slocum plans to wait until the initial rush is over, and then to build the necessary access roads and turn the shovels loose on that phase.

One of Bhakra's big excavation jobs is related to the production of aggregate for the huge chunk of concrete the dam will represent. Chief item of interest here is a blending of materials from two pits to overcome certain deficiencies in each.

Blend Aggregates

The main aggregate pit, located at Fatehwal, is long on sand and it also has a surplus of large cobbles bigger than 6 inches. A secondary pit at Niella is short on sand but long on certain finer rock sizes. By putting typical material from each pit into separate piles, then tapping the piles scientifically to create a blend, Slocum has developed a mix that's reasonably perfect by any standard.

The aggregate is a river-washed glacial material, rounded and hard. While there is some cone-crusher reduction in the line, the job is primarily one of sizing and classifying the rock particles. Then the aggregates are cooled to 42°, if summer heat gets excessive, and combined with cement and ice water to form the concrete. Artificial cooling at the time of placement was chosen to reduce thermal shrinkage of concrete, which would otherwise have produced cracks in the dam.

Aggregate production at Fatehwal starts with excavation by a Ruston-Bucyrus 120-RB shovel, which dumps

Continued on page 60

Luck Is Factor in Virginia Roads

Five quarries owned and operated by C. S. Luck, Jr., provide much of the aggregates used by the state in building its highways. Up-to-date methods are used by veteran quarry man.

IT'S through Luck that Virginia obtains much of the aggregates used in building its highways. Charles S. Luck, Jr., that is.

The Virginia Department of Highways is only one of many customers of Luck, a friendly southern gentleman who owns and operates five quarries and an asphalt-mix plant in Virginia.

C. S. Luck, Jr., started in the quarry business in 1923, when he, his father, C. S., Sr., and a brother, C. M., purchased an interest in the Sunnyside Granite Co., Windsor Farms, Richmond. Previously, the Lucks were in the contracting business.

The junior Luck managed the Sunnyside plant. In 1929, he purchased the interests of his father and brother. He started an expansion program the following year by purchasing the Boscobel Granite Co. at Manakin, Va., 15 miles west of Richmond. Today, Boscobel is Luck's largest quarry.

Luck's other active quarries are: Fairfax Quarries, Inc., three miles west of Centerville; Charlottesville Stone Corp., Charlottesville; Burkeville Stone Corp., Burkeville; and Augusta Stone Corp., three miles west of Staunton. All of the quarries are operated as separate corporations.

The city of Richmond has built up around the Sunnyside quarry, which no longer produces stone. The quarry is being filled. An asphalt plant, however, is maintained at Sunnyside. In operation as many as 14 hours a day, the plant produces eight or nine types of asphalt.

A neat white cottage at Sunnyside is the nerve center for Luck's operations. Luck himself keeps close check on his business from an attractive wood paneled, air conditioned office.

Handsome Tom Williams, not too many years removed from Virginia Military Institute, is general manager of the quarries. W. L. (Bill) Stagg, another young VMI graduate, is in charge of operations and production at all plants.

A Euclid dumps into the feeder of the 28 x 36 Traylor jaw crusher at Boscobel, Luck's largest quarry. Crushed rock drops on a 500-ft. long conveyor with a 100-ft. lift.

High Operating Efficiency

Luck's quarries are solid producers. Up-to-date methods and equipment are used. Employees are faithful and are good workers. Luck reciprocates. A couple of Christmases ago, he rewarded several of his veteran employees with expense-paid vacations in Florida. All employees are protected by surgical and hospitalization insurance.

Let's look inside Luck's quarries. Boscobel, with a face nearly 200 feet high, is the most spectacular of the five. Granite stone has been taken from this quarry for more than 70 years.

"The way they did it in those days," Williams chuckled, "was take a bar, loosen stones until they rolled down the

A shovel and a crane with a drop-ball attachment work side by side in the Burkeville quarry. The shovel loads a Dumptor.

hill. If the stones rolled all the way to the railroad track, they would be broken up with a hammer and loaded into a railroad car."

Much painstaking work in those days produced little tonnage. It's a lot different today at Boscobel, whose plant is geared to produce 2,000 tons of aggregate in an eight-hour day ranging from 3½-in. base to $\frac{3}{16}$-in. screenings.

Boscobel quarry is located in a vein of stone called Petersburg granite that runs up the historic James River. How thick the vein is at Boscobel is not known.

Overburden, mostly red clay with a layer of weathered (sap) stone, runs up to 40 feet thick. L. A. Henley, Boscobel's superintendent, had been using a 1½-yd. Bucyrus-Erie 38-B shovel to strip the overburden. In mid-summer, however, he reassigned the 38-B and replaced it with another and larger Bucyrus-Erie shovel—a 2½-yd. 54-B.

Euclid end dumps dispose of the overburden in a fill—now 100-ft. deep—in back of the quarry. Some of the sap stone, however, is fed into a Telesmith crusher to be broken down for use as sub-grade highway stone.

A Bucyrus-Erie 27-T churn drill sinks the 8-in. blast holes at Boscobel to an average depth of 150 feet. The 27-T is Luck's only churn drill. Either Ingersoll-Rand wagon drills or Gardner-Denver Air Tracs are used for drilling blast holes at the other quarries. Bucyrus-Erie bits are used on the 27-T. Operators dress their own bits.

Drilling Pattern

Blast holes at Boscobel usually are spaced on a 30 x 30 pattern. Blasts, with three or four holes shot at a time, generally are staged once a month. "We allow a ratio of two pounds of powder per ton of rock brought down, but we do better than that," Williams explained.

Atlas powder, generally with 75% of gelatin at the bottom of the holes and 60% at the top, is used at all of Luck's quarries.

Down on the clean floor of the quarry, a 38-B loads the blasted rock to two

Charlottesville Stone Corporation's plant shows in the background as this Gardner-Denver Air Trac puts down a drill hole. The Charlottesville quarry produces trap rock.

15-ton Euclid end dumps. Secondary breakage of oversize boulders is accomplished by attaching a drop ball, through use of a chain and spring attachment, to the dipper of the 38-B.

The Euclids are driven about a tenth of a mile to the feeder of the 28 x 36 Traylor jaw crusher. After passing through the crusher, the rock drops on a 500-ft. long conveyor with a 140-ft. lift, which leads over a scalping screen. Oversize stone goes through a 4-ft. Symons cone crusher, then is passed over screens (most of them 5 x 12 Tylers). Further oversize is taken through one of three Symons 3-ft. crushers. The plant has a capacity of 250 tons per hour.

Southeast Virginia is the main market for the Boscobel plant. The main line of the James River Div. of the Chesapeake & Ohio Railroad serves the plant, which is located a few hundred yards off Virginia State Route 6, an excellent two-lane highway.

A churn drill works atop Boscobel's high face while, below, a shovel loads rock.

Equipment Lineup

Other equipment at Boscobel includes: a ¾-yd. Marion 331 shovel for loading out second-grade material; two 8-ton Koehring Dumptors for hauling the second-grade material to the crusher; a ½-yd. Unit 357 wheel shovel for loading from stockpiles; a Northwest Model 104 with a 1½-yd. clamshell bucket for loading freight cars; a 20-year-old Bucyrus-Erie 41-B shovel, currently inactive; and a Caterpillar loader.

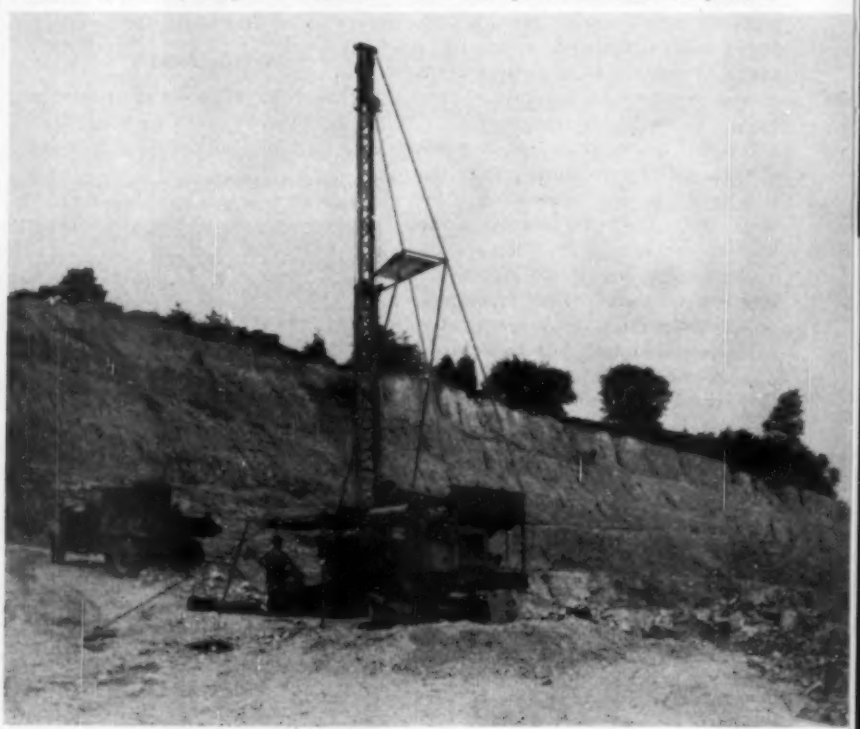
Euclid end dumps and the Koehring Dumptors are utilized at all of Luck's quarries, either for hauling overburden or transporting rock to the crushers. Luck also has a number of Caterpillar and Allis-Chalmers bulldozers and loaders and 2¼ and 1½-yd. Hough payloaders.

Much of Boscobel's aggregates is sold immediately. Trucks of customers roll steadily in and out of the plant during the spring, summer and fall. In the winter, Henley gets an opportunity to build up Boscobel's stockpiles.

Boscobel, which has about 35 employees, is in operation 5½ days a week. Heavy maintenance for all of Luck's quarry equipment is handled at Boscobel, where a new 60 x 120 repair shop is under construction.

Fairfax, Luck's second largest quarry, is located adjacent to the historic Manassas (Bull Run) battlefield, where in

Here's a close-up of the Boscobel drill, a Bucyrus-Erie 27-T, which sinks 8-in. blast holes to an average depth of 150 feet. Holes are spaced on a 30 x 30 pattern.



Stockpiled material is loaded by a Cat No. 6 shovel-loader (left) at Boscobel and a Hough Payloader at Charlottesville Quarry.

July 1861 the first big battle of the Civil War was fought. Quarry Superintendent Harry Marsh still finds relics of that unpleasantness at Fairfax, where power shovels, trucks and crushing equipment are making war against a stubborn, but yielding foe—trap rock. "We've dug up about a bushel basket of artillery shells from the quarry," said Marsh, who has been at Fairfax ever since Luck obtained it 19 years ago.

Fairfax serves the market of the nation's capitol, Washington, D. C., which lies about 25 miles to the east. The quarry, which has been opened to a depth of about 70 feet, abuts busy U. S. Route 211 for about 1,000 feet. The quarry is 500 feet across.

Fairfax's trap rock is tough and abrasive. "Demonstrators tell us that the rock here is the hardest they ever drilled in," said Marsh. "If we get 450 feet on a bit, we consider ourselves lucky."

The quarry is being worked on 15 and 40-ft. benches. An Air Trac drills 3½ and 2¾-in. powder holes—mostly 3½-in.—37 to 50 feet deep. Using Timken carset bits, the Air Trac averages about 15 feet an hour. Drillers do their own bit dressing. A Kelly air grinder is used.

"We try to stay on a 10 x 10 spacing for our drill holes," said Marsh, "although sometimes we use 10 x 11 or 11 x 12 patterns on 3½-in. holes and 8 x 8 on 2¾-in. holes. We shoot 15 to 20 holes at a time, using 1, 2 and 3 delays. Houses and the highway are close. We

(Above) L. A. Henley, Boscobel Quarry superintendent, talks to a Euclid driver. (Below) A ½-yd. Unit 357 wheel shovel loads stockpiled material to truck at Boscobel.

Between 150 to 175 loads of rock are loaded each day by this new 1½-yd. shovel at Fairfax, Luck's second largest quarry.

try to bring down about three tons of rock for each pound of powder used."

Secondary breakage is handled either by an old Bucyrus-Erie 20-B crane with a drop ball or with an Ingersoll-Rand jackhammer.

A new 1½-yd. 38-B shovel, delivered early in July, loads three Euclids with blasted rock at the rate of about 150 to 175 loads in a 10-hour day. The Euclids have a round-trip haul of less than a half-mile to the plant hopper.

Using an air hammer, a workman breaks a rock that is too large for the shovel.

The plant, which produces an average of 1,500 tons of crushed stone per day, is equipped with a 42 x 48 Allis-Chalmers jaw crusher, a 4¼-ft. Nordberg, a 3-ft. standard and 3-ft. shorthead, a 5 x 12 Tyler double-deck screen and two 4 x 12 Tyler double-deck screens.

All of the Fairfax output is trucked out, generally within a radius of 25 miles. The state of Virginia is a big customer.

Overburden at Fairfax is becoming an increasingly difficult problem. Two years ago the average depth of the overburden was eight feet. Today, it ranges from six to 30 feet. Another 38-B strips the overburden, which two Euclids haul about a quarter of a mile to a disposal area.

Blue Granite Plant

Burkeville Stone Corp., Luck's blue granite quarry located at Burkeville, about 50 miles southwest of Richmond, has a plant geared to produce 175,000 tons a year.

A new section of the quarry is being opened up by Archie Woodson, who has been superintendent for 10 of the 25 years that Burkeville has been in operation. The new section is down 45 feet; the face of the old section measured 115 feet.

Removal of about a 25-ft. layer of clay and sap stone overburden is charged to a ¾-yd. Bucyrus-Erie 22-B shovel working with two Koehring Dumptors, which make a haul of one-fourth mile.

A 38-B loads out stone on the quarry floor to two Euclids, which make a .3-mile haul to the plant hopper. A Cedarapids 25 x 40 jaw crusher is the primary unit, after which the material passes through a Traylor 12-in. crusher and a 3-ft. Symons cone. A Telesmith cone crusher breaks the oversize into 1½-in. size. The plant is equipped with 4 x 12 and 4 x 10 Tyler screens.

The plant produces ⅜ to 1½-in. stone, which is distributed within a radius of about 25 miles of Burkeville.

Drilling is done by an Air Trac. A 10 x 10 pattern is used for 3½-in. holes; 7 x 7 for 2½-in. holes. Depth of holes ranges from 10 to 30 feet. Timken and Rock bits are used.

Blasts are conducted every two weeks, with 95 to 100 holes shot using 1, 2 and 3 delays. Secondary drilling is negligible. Outsize rock is reduced by a drop ball swung from the boom of a 20-B.

Tom Williams, a VMI graduate, is general manager of C. S. Luck's five quarries.

A fourth Luck operation, Charlottesville Stone Corp., is located a few miles east of historic Charlottesville, on the fringe of the beautiful and impressive Blue Ridge Mountains. The quarry, in fact, is not far from Shadwell, birthplace of Thomas Jefferson.

Vic Moses is superintendent of the Charlottesville quarry, which produces a trap rock known as Albemarle greenstone (Charlottesville is in Albemarle County). Commercial aggregates ranging down from 3½-in. base rock are trucked as far as 45 miles from the plant.

The plant is equipped with a Cedarapids 25 x 40 jaw crusher which feeds into a 13-in. Allis-Chalmers Superior McCully gyratory crusher. Screens are Tyler 4 x 12's. Two 3-ft. Symons cone crushers are used for fine crushing.

Strip Overburden

Clay and sap rock overburden ranges from depths of 5 to 20 feet. A 22-B, loading into Euclids, removes the overburden. Euclids haul from 700 to 800 yards to the dump pile.

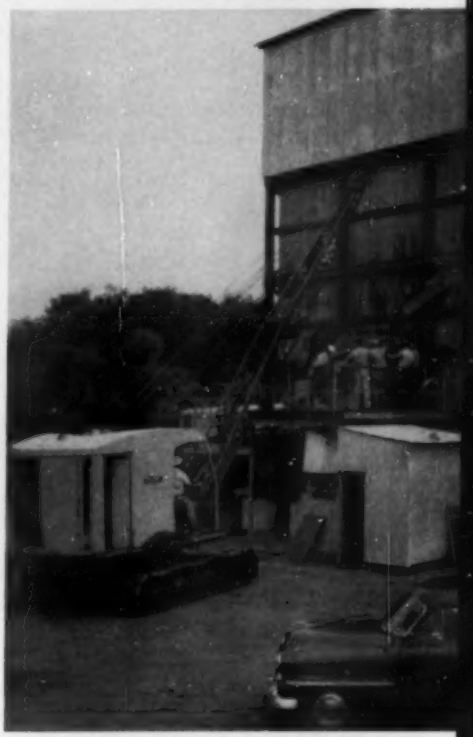
A 38-B loads the blasted stone to Koehring Dumptors, which have a haul of about 400 feet to the crusher hopper. A 20-B with a drop ball also works on the quarry floor.

Drilling is done by an Air Trac using Timken and Rock bits.

Power for the plant is obtained from the Virginia Electric Power Co., which also serves the other Luck plants. Part of the Charlottesville plant is powered by a Caterpillar D13000 diesel.

Augusta Stone Corp., located three miles west of Woodrow Wilson's hometown of Staunton, is the westernmost of Lucks' quarries. It is Luck's only limestone producer. He acquired the operation in 1951. Charles Clements is the superintendent.

Quarrying at Augusta, which has a 100-ft. face, follows a pattern similar to those at Luck's other locations: 3½-in. blast holes are drilled by an Air Trac using Timken carbide bits; a 22-B loads out stone to two Euclids at the rate of 600 to 800 tons per day and another 22-B strips overburden, which runs as thick as 20 feet, and loads it to Euclids and a Dumptor.



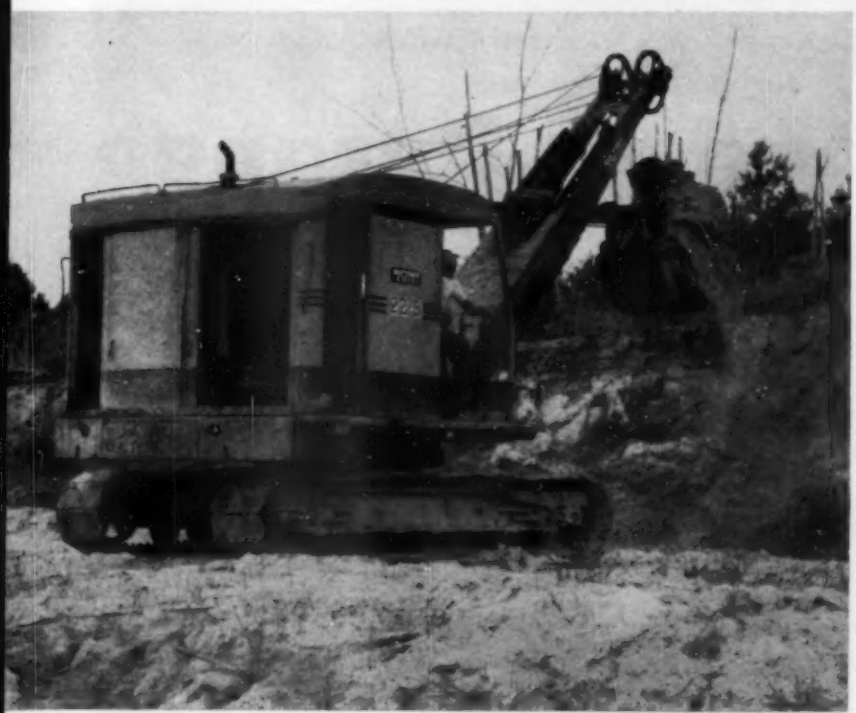
A crane is utilized as workmen at Fairfax make repairs on the crushing plant.

A Universal 20 x 36 jaw crusher is the primary crushing unit. Secondary crushing is done by two 3-ft. Symons cones. The plant has three Tyler screens —two 4 x 12's and a 3 x 12.

H. T. Spillman is manager of the asphalt plant at Sunnyside, which manufactures plant-mix asphalt for contractors, state and city highway departments and railroads. Sunnyside also handles rail shipments for the Boscobel plant.

Boscobel supplies aggregates for Sunnyside's McCarter plant, which has a capacity of 60 tons per hour. The plant often begins operation at 4:30 a.m. and continues until 6:30 p.m.

The crushed stone business in Virginia would seem to be as Luck would have it—good!



Removal of about a 25-ft. layer of clay and sap stone overburden at Burkeville is charged to this ¾-yd. shovel, which loads to two Dumptors for quarter-mile haul.

Northwestern Engineering Co. blasted out 65,000 yards of solid rock from this 3,000-ft. long rock cut to widen the narrow road.

Rocky Road to Durango

Denver firm straightens out tortuous 3.77-mile section of U. S. Route 160 in mountain country of Colorado. Job is called "Heartbreak Highway" because rock excavation is so tough.

by Floyd Suter Bixby

DURING late fall of 1955, contractors from the Rocky Mountain region gathered in Denver for an important bid opening at the Colorado Department of Highways. These men were experienced. To them, most bids are routine affairs. But this one was different. This one, covering 3.7 miles of reconstruction on U. S. route 160, east of Durango, was tricky. Conventional rock-drilling methods would be impossible here, and nobody knew how traffic could be controlled. Like a local sheriff running for office with strong opposition, these men were bidding scared.

Mark Watrous, Colorado's state highway engineer, leaned over to one of his assistants and grinned when a contractor's bid of $418,669.50 was read.

"That's the low one so far," he said, "and there's only one more to be opened."

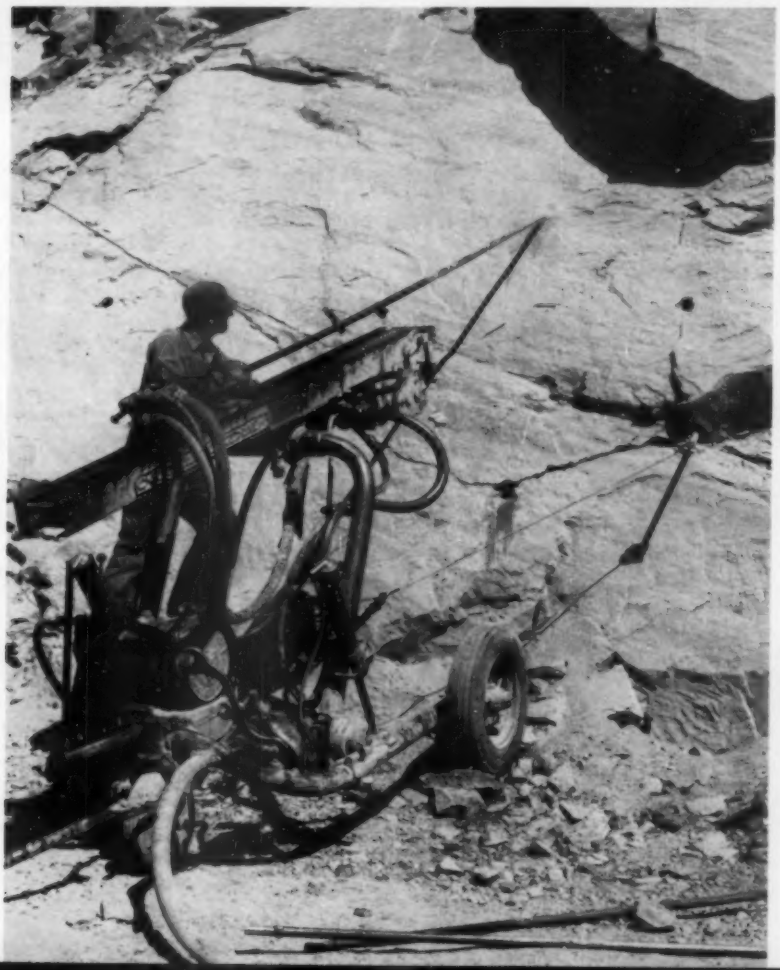
Tension mounted as the last sealed envelope was slit. The clerk then read a figure which caused pandemonium.

"Northwestern Engineering Co. of Denver bids $418,668," he announced.

It was the low bid by $1.50!

Contractors who bid on the Durango highway, and who have driven through the job since Northwestern Engineering Co. completed operations, had mixed feelings as they surveyed the finished work. But even those contractors who believe they might have made money on the project, had their bid been low, are agreed one and all that it was one of the most difficult highway construction jobs the Rocky Mountain region has seen in 20 years. J. L. Hutchinson, resident engineer on the project, said, "It's certainly the toughest one we've built in 20 years, and this district has some mighty difficult highway construction."

What made the Durango job so tough was the nature of its construction. When the original alignment was built some years ago, location engineers whipped the mountainous terrain by picking a fair route part way up on the steep side of a mountain, approximately halfway up between the rimrock and the Animas River far below. Although alignment was relatively good, construction of that day consisted of benching out a 20-ft. road cut in the steep, rocky wall. The edge of the old road terminated in thin air, and there was almost a sheer drop to the Denver and Rio Grande Railroad's narrow-gauge tracks about 40 feet below.



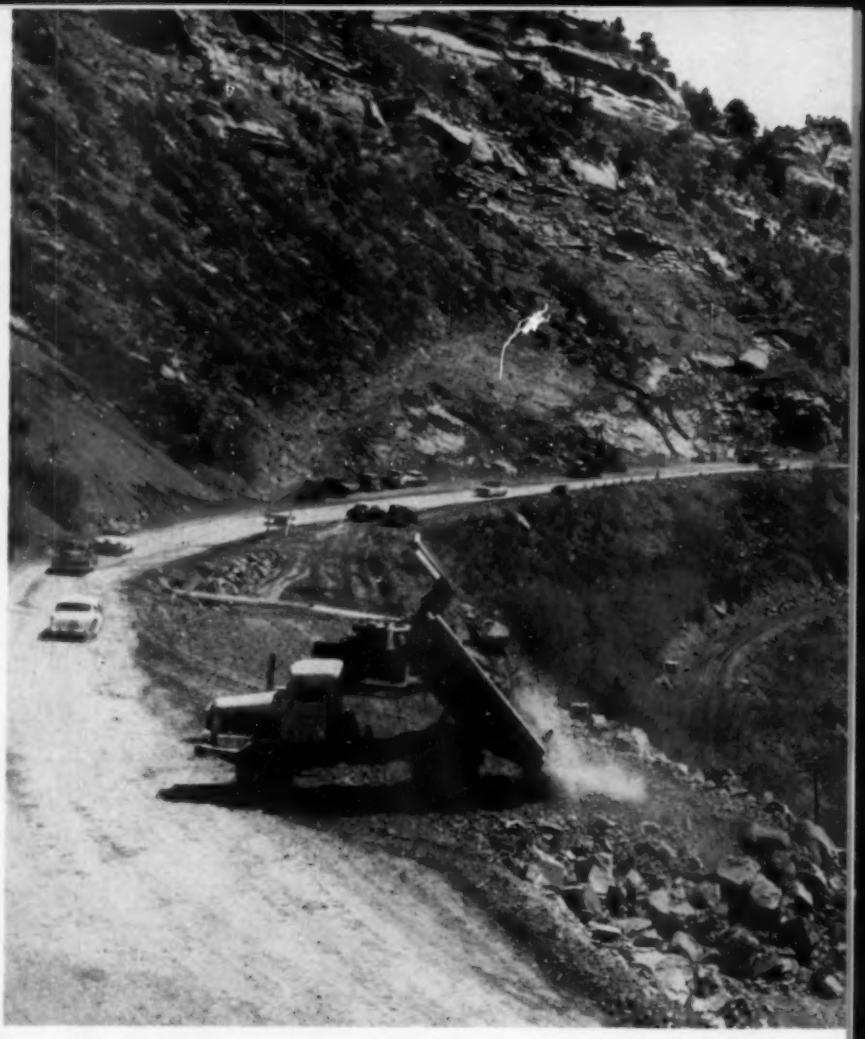
(Above) Jackhammer man sinks hole for secondary shooting. (Below) Wagon drill is held tight against rock face by steel cable and air tugger mounted on machine.

65,000-yd. Cut

The reconstruction job included one 3,000-ft. section where the contractor had to remove a 65,000-yd. solid rock cut without damaging the adjacent railroad, and at the same time carrying a 4,000 vehicles per day traffic count through the narrow 20-ft. construction bench. Coupled with these nearly impossible features was the fact that conventional pioneering and vertical drilling of blast holes was considered impossible—or at least much too expensive to attempt. The highway had to be widened "as-was" by toe-hole drilling in a sloping rock face in short sections. Attendant problems of secondary shooting were assured almost automatically.

This 3,000-ft. rock cut was a guiding factor in setting November 1955, as the bid date, with a contract awarding date of December 5, 1955. That particular timing, assuming a not-too-severe winter, would permit the contractor to concentrate on excavating the rock cut during a time of the year when traffic was at the lowest ebb. The wisdom of this decision has been borne out since, because Northwestern Engineering Company's crews and equipment managed to complete the difficult rock cut phase of the assignment just two jumps ahead of last summer's tourist season.

The reconstruction left a practically vertical rock wall along the mountainside, with a 10-ft. bottom ditch which will trap any rock which sloughs off. Outboard from this ditch is a roadbed 44 feet wide, capable of accommodating four-lane traffic. Like its predecessor, the edge of the new 44-ft. road terminates in thin air just above the D&RGW tracks. Northwestern's contract also included drainage provisions, the production and installation of 4 to 16 inches



As shovel works in background, a Euclid end-dump places rock in fill area. D&RGW railroad is at foot of slope.

of granular rock sub-base, and a 2½-in. plant-mixed asphalt surface paving placed full width over the base course. Major quantities included 280,000 cubic yards of excavation, of which approximately 75,000 was solid rock; 40,000 tons of 2½-in. minus sub-base material; 14,000 tons of ¾-in. minus base-course surfacing; 12,000 tons of plant-mix pavement; and 3,000 linear feet of corrugated metal pipe drains, 18 to 72 inches in diameter.

Improved Road Design

The work which Northwestern Engineering Co. finished last year will make the highway safe for 1957-model traffic moving at a design speed of 50 mph. Maximum curvature occurs at one point where there is a 6° spiraled alignment. Maximum grade is 3.318%. Minimum sight distances are 430 feet horizontally, and 490 feet vertically.

Drillers, shovel runners, and superintendents who battled for months with the 65,000-yd. rock cut, say that it tops any assignment of its kind ever thrown their way. Ever-present traffic, even in winter, made it impossible to work steadily. The sharply sloping rock wall with loose rocks up above created a condition so dangerous that drillers worked under constant tension. Powdermen with long established reputations, who could plot the behavior of a conventional explosives shot almost to the foot, watched hopelessly as their powder charges rolled out great chunks of the mountain wall —with excessive horizontal throw— and with attendant secondary shooting problems. Foremen and superintendents interested in getting things done quickly and at a profit became frustrated and angry when the piecemeal hacking away continued week after week.

It was almost like tunnel excavation. Shovel runners, who knew they could turn out 150 loads in a shift in normal digging, found that 50-load days had a way of getting under their skin. But there was nothing they could do about it, because at regular intervals they had to walk their machines away from the rock bank to let traffic through. And shovels don't produce when they're dead.

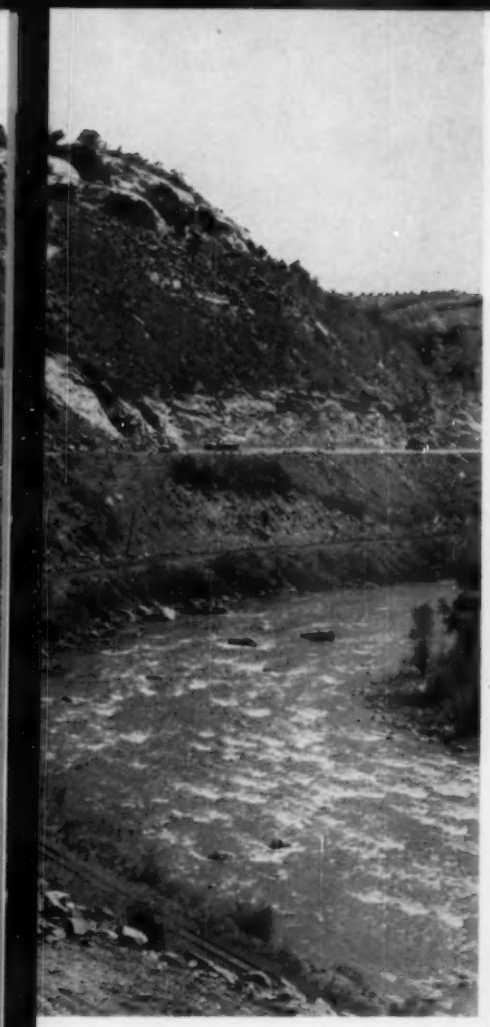
From its main equipment pool in Denver, Northwestern Engineering Co. assigned some of its finest machinery—equipment which has been proved time and again on other jobs. Drilling machinery included a 600-cfm Gardner-Denver air compressor, a 500-cfm Chicago Pneumatic, and a 220-cfm Schramm. Three Gardner-Denver wagon drills were brought in. One of these machines was mounted on the back of a flatbed truck so that with 24-ft. steel it could reach up far enough on the rock face to break the bank loose to the top.

20-ft. Working Bench

Since the rock formation consisted principally of bedded blue shale and sandstone, regular Timken rock bits were used rather than tungsten-carbide tips. Things were worse at the start when there was only a 20-ft. bench available both to traffic and construction equipment. An attempt was made with Ingersoll-Rand jackhammers and a Caterpillar D8 dozer to pioneer one end of the cut, but the effort was soon abandoned because of its expense and near impossibility. Project officials decided instead to sink 2½-in. diameter holes in a pattern averaging six feet apart in the sloping rock face.

But how do you hold a wagon drill tightly against such a face while you crowd the steel and bit into the hole? Drillers soon found that the only answer was to jackhammer a small hole in near the base of the cliff, stick a piece of drill steel in, and then snug the machine in tight with the help of a steel cable and air tugger mounted on each wagon drill. Holes were drilled by sloping them downward, by drilling them straight in, and by sloping them upward to reach as high as possible. At one point, a 60-ft. cut was required, so it was necessary to depend on approximately a 25-ft. breakout of material near the top without explosives. Because traffic was such a problem, a maximum limit of 75 feet was set on the length of a shot along the highway. Even so, when the shots were pulled with the help of DuPont 40% gelatin-type powder loaded almost to the surface in a column-type method, the shots almost always rolled out many large oversize boulders which then had to be re-drilled with jackhammers and broken up by secondary shooting.

On one such shot, which exemplifies the problem as well as any, a mass of the mountain totaling approximately



1,200 cubic yards had been loosened, but that was about all. In an attempt to work the material out, one of the three Bucyrus-Erie 38-B loading shovels assigned to the job worked for nearly 10 hours one day loading and trying to work loose the tight-knit blocks of broken rock. It was slow, brutal pounding, and while a great deal of rock was loaded out near the toe, there was still a major percentage of the big block lying dangerously in place when the sun went down at the end of the shift.

Men wondered during the night how drillers would be able to loosen the formation in the morning. Then, with all the perversity of such materials, the whole mass slid down sometime during the night, blocking the highway so that a dozer operator had to be called out on an emergency basis. Things like that aren't especially calculated to make superintendents happy.

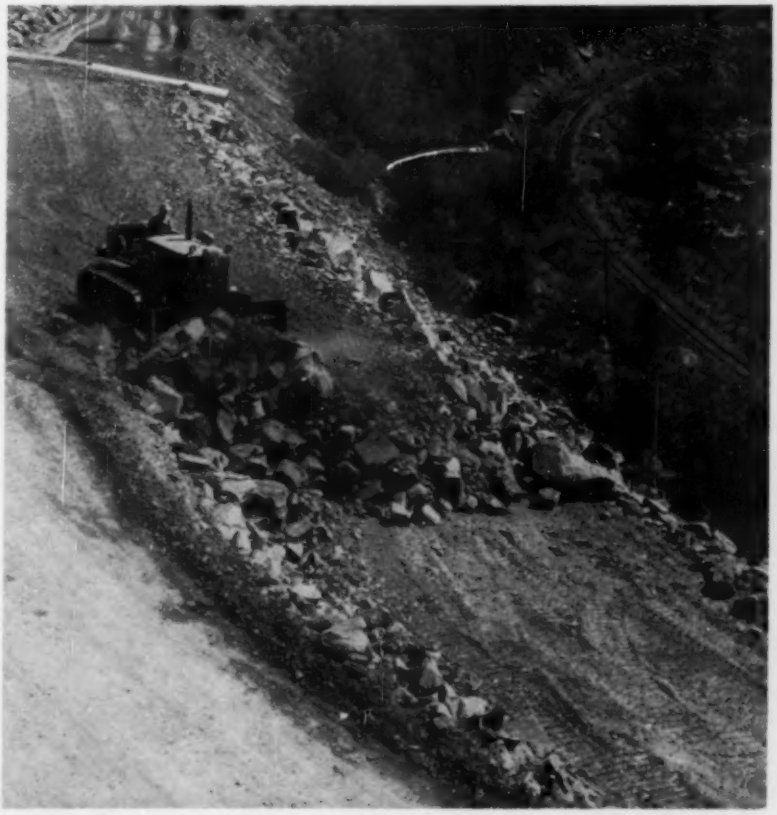
The 38-B power shovels were equipped with 1½-yd. Amsco dippers. All were powered by Caterpillar D13000 diesel engines. Loading equipment under the shovels included four end-dump Euclid trucks and two Koehring Dumptors, making a hauling fleet good on both long and short hauls. This versatility was highly desirable because, while most of the rock involved a short haul, there were some maximum hauls of 9,500 feet where the end-dump Euclids could operate to good advantage.

Bad Horizontal Throw

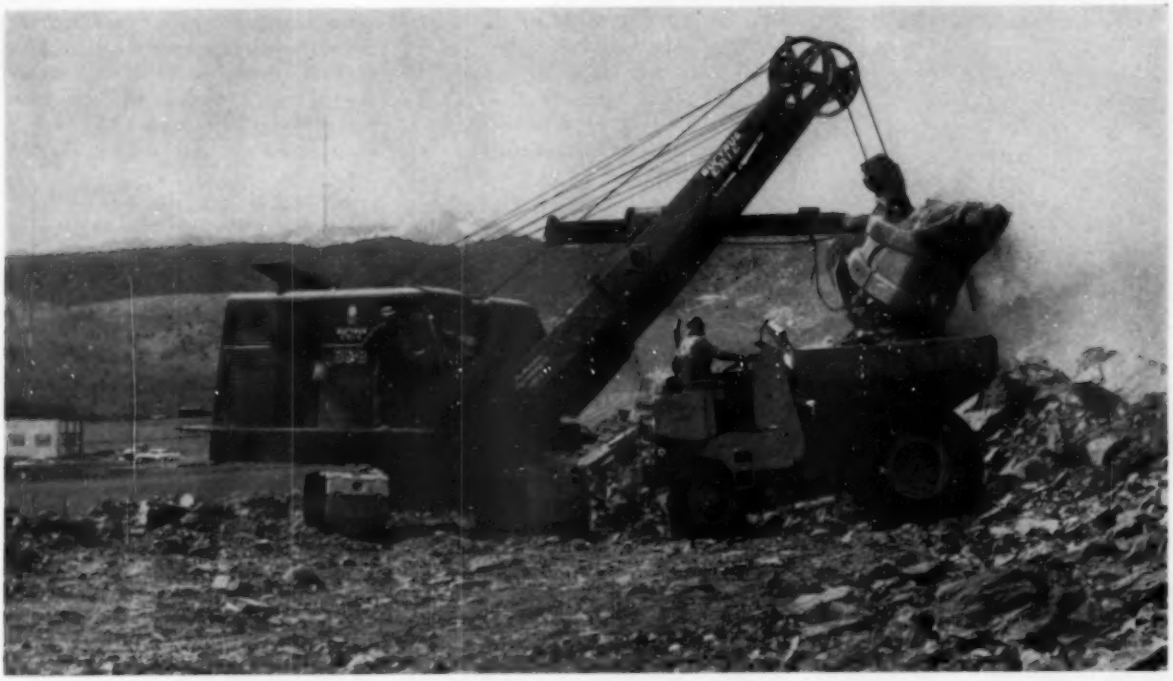
Despite their best attempts, parts of the job met with varying degrees of failure not through any individual's fault. For example, a few explosives shots threw rock horizontally so that some telephone lines along the railroad tracks were broken and had to be repaired. In one particularly narrow spot, enough rock shoved over the highway and off the edge to throw rock down on the tracks. It took 40 minutes to clear the rock away. And not all of the shovel performance was what a good superintendent would want. During early-stage construction, when one of the power shovels could work only about four hours out of every shift because of traffic accommodation, from 500 to 600 cubic yards per day was an average rather than the exception. Later on, when the machines had widened the highway out where there was more room to work, production began to jump up toward the 1,200 to 1,400 cubic yards per shift figure, of which the 38-B is easily capable under normal digging conditions.

All broken rock was used in highway fill construction by end-dumping the material from hauling units at the edge of fill lifts. These lifts were built approximately in the thickness of the biggest size rock which the power shovels had been able to load. A Caterpillar D8 dozer then shoved the material ahead from the end of each lift until the longitudinal distance across a given fill section had been filled. The process then was repeated. The rock was sufficiently well graded, so that there was some fine material to sift down between the interstices of the coarser particles. By May 1956, the worst part of this tricky rock cut, with its sharply downward, angling rock formation, had been successfully removed.

There was very little dirt in the unclassified yardage on the project. Most of the material listed as unclassified con-



All rock blasted from the big cut is used in fill construction. Working fast as the Eucs haul in loads, A Cat D8 dozer shoves the rock forward to level out the lift.



A rubber-tired Koehring Dumpter works under a 1½-yd. shovel. On shorter hauls, the two move up to 150 yards per hour.

sisted of rocky overburden, some clay and a great deal of cemented gravel and boulders. There was also some shale which could be ripped, and therefore was classed other than solid rock. After ripping, it could be moved by tractor equipment.

Northwestern Engineering Co. moved in three 18-yd. Euclid scapers with four-wheel rubber-tire prime movers, and a Caterpillar DW21 scraper combination for this work. Five Caterpillar D8's also were brought in, four equipped with dozer blades. One of the machines which was used part of the time as a pusher tractor was equipped with a two-tooth Ateco ripper, hydraulically controlled, mounted on its rear frame. There was also a large single-tooth LeTourneau K-30 rooter for some especially heavy work. The balance points were arranged so that some of the longest haul disposal was on the unclassified item. Material which this equipment fleet could move was located on both sides of the 65,000-yd. rock cut, some of it in terrain which was considerably easier to pioneer with dozers.

A single-unit push-loading system was used on this tractor equipment. Better management control of this operation was possible, because it was considerably easier than the hard-rock grading had been. The rubber-tired grading part of the job was closed down between January 15 and April 1, concentrating all crews and effort on the rock work which could continue in practically any kind of weather. Through careful bidding, Northwestern Engineering Co. also landed a contract for easier grading and highway construction at Cortez, Col., about 40 miles away, so that a considerable part of the period between shutdown and reopening date on the Durango job could be used moving dirt at Cortez.

Lay Down 10-in. Lifts

Unclassified excavation moved by the tractor fleet was brought into fill areas and dumped in lifts averaging approximately 10 inches in thickness. Water was added by a large International 5,000-gallon truck unit, and two 2,000-gallon Ford trucks. Sheepsfoot rollers were used to compact the material down to 90% Modified AASHO density as required by specifications.

From a single setup at the mouth of a canyon not far from the east end of the project, a Cedarapids 2540 Primary coupled with a Master Tandem rock plant was brought in and set up to produce base-course material and mineral aggregates. The latter material was used later in constructing the plant-mixed asphalt surface mat. The canyon mouth deposit consists of rounded stream boulders and sand which have worked their way down in ages past as the canyon eroded under action of a small stream. Engineers chose the site as an excellent answer to the problem of producing and creating a strong, flexible sub-base which will transfer traffic loads from the pavement to the rock and earth underneath.

In moving through the plant setup,

There was very little dirt in the job's unclassified excavation yardage. This dirt cut was made by dozers and scrapers.

raw pit-run material was dug out by a 38-B shovel, loaded into a pair of Koehring Dumptors and hauled to the feeder trap which kept the plant supplied with raw material. In its reduction and sizing system, the rock plant used a double-vibrating screen deck which scalped off oversize material and routed it through a 10 x 36 jaw crusher. Throughs from this crusher then joined material retained on the bottom deck and passed through a system of 40 x 22 roll crushers arranged in closed circuit with the screen decks, so that absolute and final sizing was accomplished. Material dropping through the bottom screen deck met specification requirements and was sent out by stacker conveyor to a 21-yd. surge bin, where trucks were loaded.

Well-Planned Setup

There again good management paid off. The timing was such that the rock plant could be moved in during the very early spring, and its crew retained for later summer work by giving them the job of producing all the aggregates for the hot-mix on this project. The total tonnage of that material was produced and stockpiled at the plant location, with the expectation that by the time this would be done enough subgrade would be completed so that production and installation of the sub-base rock would be started. It worked out just about that way.

The granular base-course material was installed by the most careful, modern methods. After being screened to either the 2½-in. minus or ¾-in. minus size requirement for this material, rented dump trucks hauled it to the highway where is was dumped in the exact volume necessary. Heavy thicknesses of material—for example, in the 16-in. base section—were placed in several lifts not exceeding five inches. After being dumped on the road, the material was blade mixed by one of two No. 12 Caterpillar motor graders while water was added as necessary by the water-hauling units. The base-course rock then was leveled out in thin lifts by the No. 12 motor graders and rolled down tightly to approximately 95% Modified AASHO density by both pneumatic and steel-wheel rolling equipment. Purpose of the finer rock in the leveling course near the top of the sub-base was to permit a much closer surface finish, so that the Barber-Greene asphalt finisher could have as smooth a base as possible to work from in laying the final plant-mixed material.

J. L. Hutchinson (left), project engineer for Colorado Dept. of Highways, confers with R. S. Blanchard, general superintendent of construction for Northwestern.

According to project officials, a Barber-Greene Model 848 continuous-mix hot plant was moved in and set up at the mouth of the canyon where the rock plant had been working. A 150-200 penetration grade asphalt cement was used in the paving mix at the ratio of approximately 6%.

Job officials take pride in the fact that usual average traffic delays during blasting averaged only 10 minutes, and that in one extreme case, when the highway was blocked by a very heavy blast, traffic was tied up a maximum of one hour and 42 minutes. Someone with a mind for statistics counted the cars which had piled up one day behind an 18-minute delay—which was considered excessive at that time. The count of piled-up automobiles was 170, denoting average traffic density during these early spring months.

The fact that traffic was handled safely through the rock section is a tribute to the contractor's organization and to the three flagmen who risked their necks many times controlling the automobiles and trucks as they passed through.

For Northwestern Engineering Co., the project was under the supervision of R. S. Blanchard, general superintendent in charge of all construction operations in the company's Denver district.

G. Henry Eberhardt was project superintendent; B. A. Leo, grade superin-

Continued on page 64

News from the Field

Estimate 1957 Construction

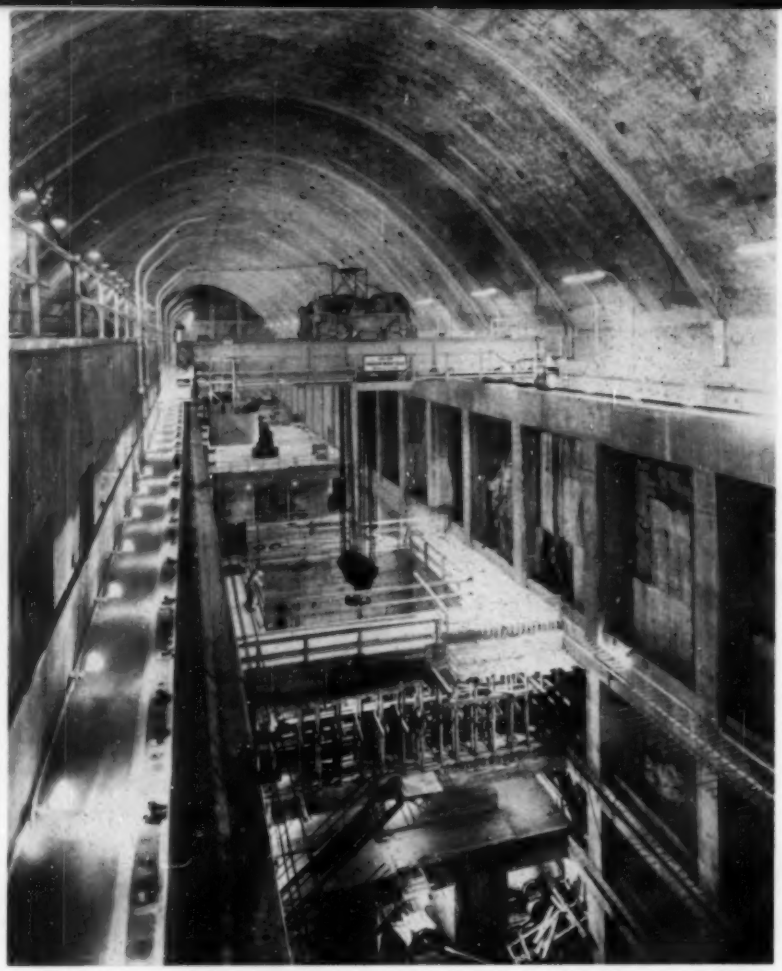
Smashing dollar volume records for the eleventh consecutive year, construction activity in 1956 totaled an estimated $60.6 billion in the continental United States, and the potential indicated at the end of the year was for more than $64 billion in 1957, The Associated General Contractors of America, Washington, D. C., recently reported.

The 1956 total of more than $44.1 billion in new construction and $16.5 billion in maintenance and repair of existing facilities represented an increase of about 3% over the $58.9 billion total put in place during the construction year of 1955.

The association divided its estimate of the 1957 potential into $47.4 billion for new construction and $17 billion in maintenance and repair work in the continental United States, with nonresidential construction and state and local public works expected to provide the thrust to more than offset a continued decline in housing volume. It was stressed, however, that if progressively tightening credit conditions persist in 1957, this potential probably will not be realized.

Kitimat Smelter Expands

Potentially the world's largest aluminum smelter, a sprawling plant at Kitimat, B. C. is now producing ingot for the Aluminum Co. of Canada, a subsidiary of Aluminium Ltd. (spelling correct). Five years ago, Kitimat was only an Indian village in the northern wilderness, 100 miles from the Alaskan Panhandle, when Aluminium Ltd. decided to make aluminum there because of the tremendous hydroelectric resources nearby. The town, with a population of 11,000 today, now has a railroad line, steamship facilities, and will soon have an outlet by road to the rest of Canada.



Kemano powerhouse is located more than a mile deep inside huge Mount DuBose. Still under construction, it supplies power for the Kitimat (B. C.) smelter of Aluminium Ltd.

On August 3, 1954, Aluminium Ltd. finished a three-year project of damming up the Nechako River and reversing its flow; building a huge powerhouse inside Mount DuBose, 50 miles to the south at Kemano, B. C.; and stringing a powerline from Kemano to Kitimat, over 5,000-ft. high Kildala Pass. On that date, the Kitimat smelter, located at the head of an ice-free fiord 90 miles from the Pacific, began turning out ingot at a rated capacity of 91,500 tons a year.

Today, a little over two years later, with demand high in the United States and world markets for Kitimat ingot, the smelter is operating at a rate of 150,000 tons. Construction crews are pushing work on potline No. 5, which will boost capacity to 180,000 tons. The original target date for this line was the end of the year, but Franklin G. Matthias, Kitimat construction boss and the man who built the Hanford (Wash.) atomic project during World War II, says he hopes to have his part of the job done by fall.

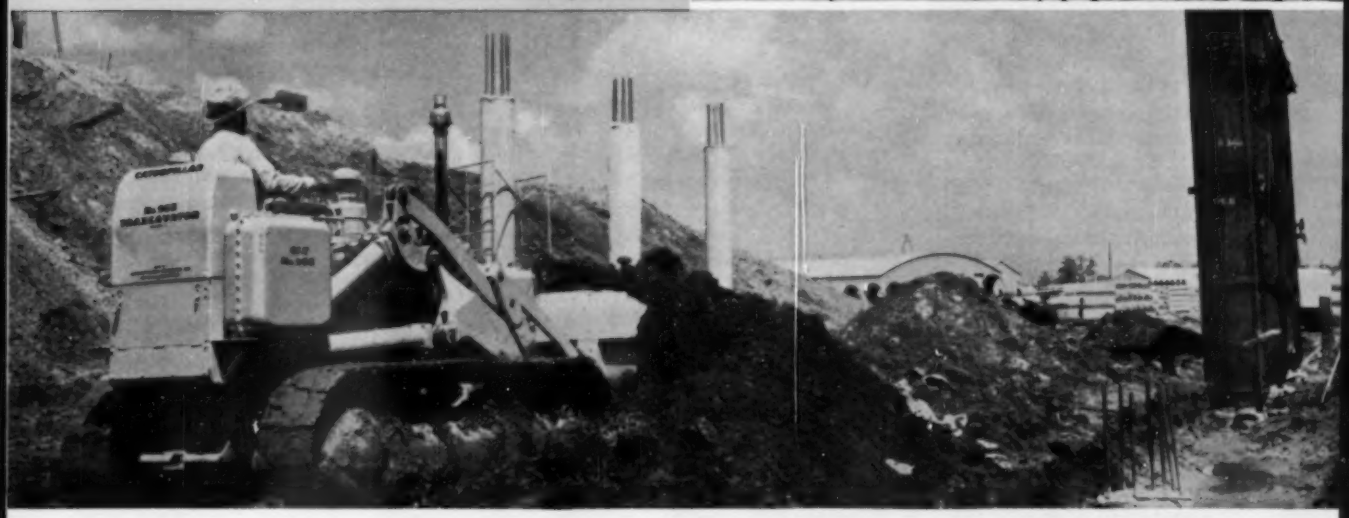
The big expansion here is a part of a company-wide buildup into which Aluminium Ltd., world's second largest aluminum producer, will have put over $1 billion between 1951 and 1959, when the Kitimat smelter is scheduled to reach 330,000 tons capacity.

One of the latest additions to this

Continued on page 40

"ONE DEMONSTRATION OF THE NO. 955 TRAXCAVATOR* AND I WOULDN'T LET THEM TAKE IT BACK!"

F. V. Minor, Dallas, Texas



F. V. Minor had a subcontract from Austin Bridge Co. to dig bridge abutments and clean up dirt along a railroad overpass retaining wall west of Dallas. The earth was packed hard and when he tried to use a loader of another make, he found the machine just couldn't get into it.

Then the Caterpillar Dealer brought a No. 955 Traxcavator out to demonstrate. And once he'd seen how it did the work, Mr. Minor wouldn't let them take it away. A lot of other contractors know just how he felt. The Caterpillar No. 955 Traxcavator has been a success from the day it was introduced. It really licks the tough jobs.

This fast, efficient excavator-loader has a 1½-cu.-yd. bucket, 80 inches wide. A dependable 70 HP CAT* D315 Engine gives it plenty of digging power in tough materials. The bucket has full 40-degree tilt-back at ground level to prevent spillage, and 128-inch lift height for easy loading.

Operators like the No. 955 for its exceptional visibility and fast-acting hydraulic controls. Bucket lift and tilt levers are positioned for easy one-hand operation. And the exclusive Caterpillar oil clutch adds to long work life and reduces maintenance.

If you've got a difficult excavating problem, ask your Caterpillar Dealer to demonstrate a Cat-built Traxcavator right on your job. In addition to the No. 955, he can show you the No. 933 (1 cu. yd., 50 HP) and the No. 977 (2¼ cu. yd., 100 HP). He'll prove to you that they're built to do more work and harder work at lower cost. You can count on him, too, for prompt, reliable service and parts you can trust. Talk to him today.

Caterpillar Tractor Co., Peoria, Illinois, U.S.A.

CATERPILLAR*

*Caterpillar, Cat and Traxcavator are Registered Trademarks of Caterpillar Tractor Co.

NAME THE DATE... YOUR DEALER WILL DEMONSTRATE

Continued from page 38

program is a $250 million expansion underway in the province of Quebec, which will bring in 120,000 tons more of smelter capacity and 1 million hp hydroelectric capacity.

More than 1,500 construction men are at work at Kitimat under Matthias' command, filling and leveling the long stretch of ground on which new smelter buildings will rise, and erecting the steelwork and aluminum siding of potline No. 5.

The smelter area alongside Douglas Channel originally was a soggy rainforest which had to be cleared and given a foundation solid enough to support the great weight of the smelter.

Completion last winter of a Canadian National Railroad line from Kitimat, to Terrace, B. C., 40 miles to the northeast, means that ingot is now shipped out by rail car, as well as by ship. It means also that construction materials and other goods can come in by train. For example, 6,000 tons of structural steel needed to build the last three potlines came by rail from Vancouver, B. C.

Construction of hydroelectric facilities at Kemano was performed by Morrison-Knudsen Co. of Canada, Ltd. The power generating facilities include an underground powerhouse 710 feet long, 81 feet wide and 118 feet high, which was carved out of solid rock by M-K of Canada crews. A 10-mile long horseshoe-shaped power tunnel with a 25-ft. diameter bore supplies water from a mountain reservoir.

Alumina, the oxide from which pure aluminum metal is drawn, is supplied to the smelter by ship from the British West Indies.

John W. Stang, Sr.

John W. Stang, Sr., president of the John W. Stang Corp., nationally known wellpoint manufacturer, died December 1.

Born in Philadelphia, Pa., in 1900, Mr. Stang entered the construction equipment industry as a youth. For many years he enjoyed outstanding success in pioneering and selling newly developed heavy-duty construction equipment to the trade.

In 1940, he established the corporation bearing his name, specializing in wellpointing and other phases of hydraulic and dewatering engineering services. The firm is now one of the largest of its kind in the nation.

Mr. Stang was a member of the Moles; a charter member of the Beavers; and an associate member of the American Society of Civil Engineers.

He is survived by his widow, Alice; two sons, John W., Jr. and George A., both active in the business; a daughter, Dorothy A. Eisenberg of New York, N. Y.

Cement Assn. Head Named

George E. Warren, president of Southwestern Portland Cement Co., Los Angeles, Calif., was recently elected chairman of the board of directors of the Portland Cement Assn.

Warren has served on the board of directors since 1953 and as a member of the executive committee during 1956. He succeeds Emory M. Ford, chairman of the Huron Portland Cement Co., Detroit, Mich., who has been the association's board chairman during the past two years.

Eight new directors were also elected by association members. They are W. K. Farst, general manager, Pittsburgh Plate Glass Co., Columbia Cement Div., Zanesville, Ohio; John S. Lind, general manager, St. Mary's Cement Co., Ltd., Toronto, Ont., Canada; Leonard E. Bayer, president, National Cement Co., Birmingham, Ala.; Robert E. Pflaumer, president, Standard Lime & Cement Co., Baltimore, Md.; Charles E. Shearer, president, Keystone Portland Cement Co., Philadelphia, Pa.; Ben W. Calvin, president, Aetna Portland Cement Co., Bay City, Mich.; C. F. Lewis, president and manager, Volunteer Portland Cement Co., Knoxville, Tenn.; and D. A. Symmes, president, Glens Falls Portland Cement Co., Glens Falls, N. Y.

Association activities are limited to scientific research, development of new or improved products and methods, technical service and educational effort.

British TV Center

Construction has begun in London on one of the most advanced television centers in the world. It will take between five and six years to build and cost about $15 million. The TV center is at Shepherd's Bush, Wood Lane, London, on the site of the Franco-British Exposition of 1908.

The initial project will develop about half of the area and leave the remainder unplanned until the British Broadcasting Corp. determines future TV needs. The architectural conception

A Ruston-Bucyrus dragline excavates site of main block of British Broadcasting Corporation's television center in London.

of the half-site scheme, however, has taken into account the eventual development of the entire site. The original plans were prepared in 1951, but since then many radical changes have been made. Two buildings on the outskirts of the original scheme have already been built. They are a scenery block and a canteen block, which will be connected with the vast center block, when completed, by passageways and tunnels.

The scenery block covers approximately an acre and contains extensive workshops as well as 200 offices for administrative staff.

The main block will consist of a multi-story "ring" around a courtyard which will be 150 feet in diameter. The building will provide accommodation for seven studios, two presentation studios, telecine and telerecording areas, dressing rooms, wardrobe services, engineering areas and offices.

The outer perimeter of the block will be enclosed to form a runway along which scenery and property will be conveyed from the scenery block direct to the studios.

Excavation of the part of the old exposition grounds where the main block is to rise involved removal of a lagoon which had been one of the highlights of the Franco-British Exposition. The plans called for the excavation of the whole site to an average depth of 15 to 16 feet below the previous ground level.

About 104,000 yards of loose material, the equivalent of nearly 80,000 yards of normal digging, were excavated during a four-month period. A Ruston-Bucyrus 33-RB and a 43-RB dragline were employed.

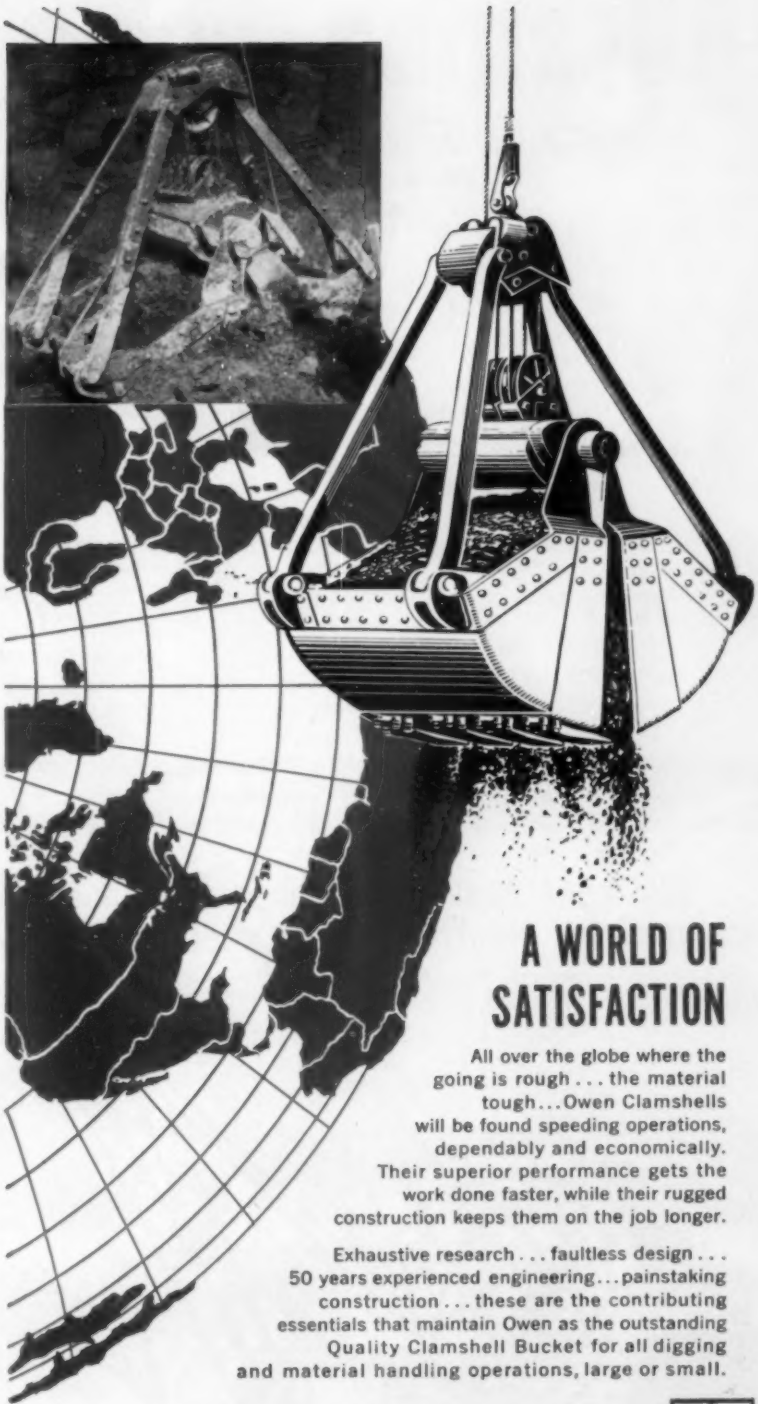
Architect for the project is Graham Dawborn, with Sir Howard Robertson and Sir William Holford as consultants. M. T. Tudsbery is consulting engineer to BBC.

The excavating contract is held by George Wimpey and Co., Ltd., London.

Illinois SAE Group Meets

The central Illinois section of the Society of Automotive Engineers will hold its annual earthmoving industry conference at the Pere Marquette Hotel in Peoria, Ill., March 26-27.

The conference offers a technical meeting for people whose interests lie in earthmoving or associated fields. The keynote address, related to the Federal highway program, will be delivered by Bertram Tallamy, who was recently appointed to the position of Federal Highway Administrator.



A WORLD OF SATISFACTION

All over the globe where the going is rough . . . the material tough . . . Owen Clamshells will be found speeding operations, dependably and economically. Their superior performance gets the work done faster, while their rugged construction keeps them on the job longer.

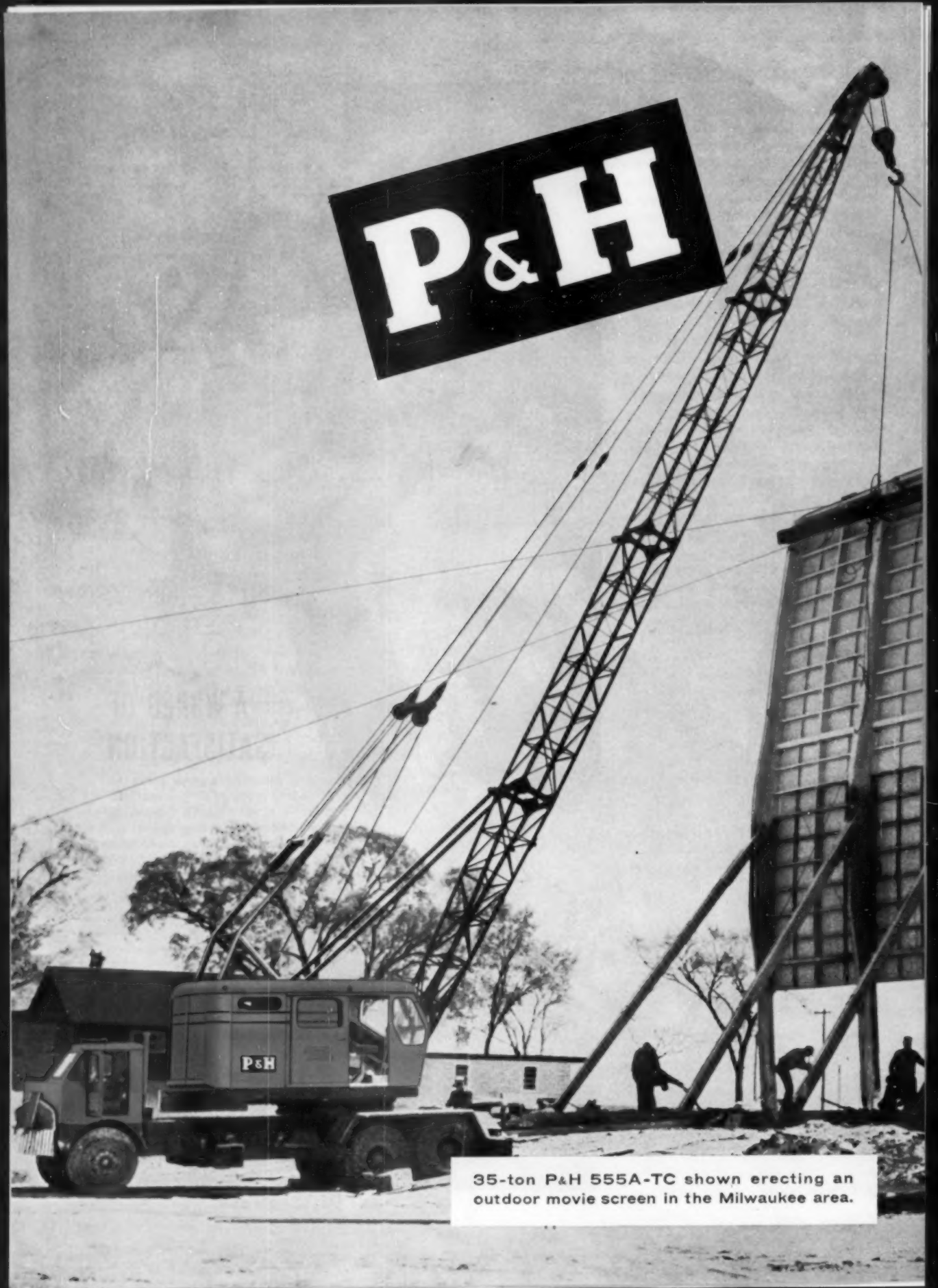
Exhaustive research . . . faultless design . . . 50 years experienced engineering . . . painstaking construction . . . these are the contributing essentials that maintain Owen as the outstanding Quality Clamshell Bucket for all digging and material handling operations, large or small.

Write today and get the convincing facts and latest catalog . . . all free upon request.

The OWEN BUCKET Co.

BREAKWATER AVENUE, CLEVELAND 2, OHIO

BRANCHES: New York • Philadelphia • Chicago
Berkeley, Calif. • Fort Lauderdale, Fla.



35-ton P&H 555A-TC shown erecting an outdoor movie screen in the Milwaukee area.

Costs $89 a day...earns $160*

with 35-ton P&H "Job-Designed" Crane

In the 35-ton classification, there are more truck cranes with the familiar P&H trade mark than any other make—BY FAR! One reason for this unique acceptance is the fact that operators *know* P&H designs and builds both the upper and carrier expressly for 35-ton needs—giving owners a single source of responsibility.

An example of the P&H 555A-TC putting in more working days at a higher profit is the rig pictured at the left. Customers of the John Hennes Trucking Co., Milwaukee, Wis., keep this 555A-TC constantly on the go. Records show this machine costs $89.26 a day (depreciation excluded) to operate and it earns $160.

This profitable production is typical of P&H performance. It comes from such features as the P&H Planetary Boom Hoist. Lowering is always done under power and the boom can be safely held in any position. *The P&H Planetary Boom Hoist is a standard feature.*

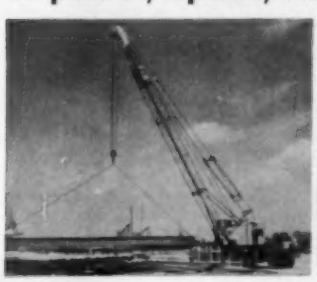
Another plus for P&H owners is the extra-strong booms supplied with the 555A-TC. Alloy steel and lattice construction makes these booms more rugged—and at the same time lighter. Goose-neck type, open-throat booms provide maximum boom load clearance.

Add to these exclusive features the famed P&H all-welded construction and live roller circle and you, too, will see why the P&H 555A-TC is the most popular truck crane in the 35-ton field. Call your P&H dealer. No matter what the capacity of your jobs, he can show you a P&H model to help you dig or lift more at a lower cost.

Harnischfeger Corporation
Construction & Mining Division
Milwaukee 46, Wisconsin

THE P&H LINE Truck Cranes: 8, 10, 15, 20, 25, 30, 35 and 40 tons
Shovels: ½, ¾, 1½, 1¾, 2½ and 3½ yards

Across the country P&H machines lead the field in power, speed, flexibility and profitable performance



TEXAS
For handling loads up to 20 tons profitably there is the P&H 255A-TC. Here is Brown & Root's third Model 255A-TC shown at work on construction of off-shore drilling platform at their Marine Division Shipyard.

CONNECTICUT
Earthmoving Service & Equip. Corp., profits from the greater strength of the 2½ yd. P&H 955A in moving tremendous quantities of borrow. Job is part of new Connecticut Turnpike.

VIRGINIA
In the ¾ yard class, Commonwealth Sand & Gravel Co. of Richmond depends on the speed and accuracy of the P&H 255A for increased production. It is shown here equipped with 40 foot boom and ¾ yard clamshell bucket.

***Write today for Verified P&H Cost-Performance Facts**

Harnischfeger Corporation, Dept. 502-B
Construction & Mining Division
Milwaukee 46, Wisconsin

Gentlemen:
Please send me field report No. 5504 on the 35-ton P&H 555A-TC.

*Name*_____

*Title*_____

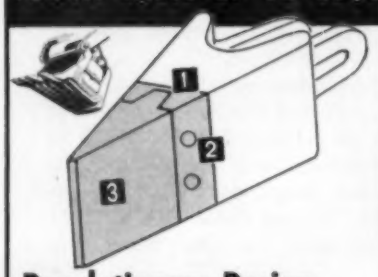
*Firm*_____

*Street*_____

*City*_____ *Zone*_____ *State*_____

NEW!
Bulldog Replaceable Digger Teeth

CUT INVENTORY AND REPLACEMENT TOOTH COSTS UP TO 65%



Revolutionary Design Has Just 3 Parts

1. *Universal Weld-On Adapter* uses old tooth as a base. Saves the cost of conventional adapter or new tooth. Same adapter fits on several different types of equipment. Easily welded on worn teeth.

2. *Positive Lock Pins* that give a tight fit to the replaceable tooth and are easily removed for replacement.

3. *Easy Change Replaceable Tooth**, changed with a hammer and punch. Has reversible bevel point. Made of highest quality alloy steel — heat treated to outwear all other teeth. Field tested in taconite mines under toughest abrasive conditions, Bulldog Teeth have consistently shown cost savings up to 65%.

YOU NEED ONLY A FEW ADAPTER SIZES TO FIT ALL POPULAR MAKES OF

Shovel Dippers — Dragline Buckets
Back Hoe Buckets — Clamshell Buckets
Loader Buckets

For descriptive folder, technical data, prices, and name of your nearest dealer—

**pat. pending* *Write Dept. EC-2*

Sales Representative and Distributor Inquiries Invited

ALLIED
STEEL & TRACTOR PRODUCTS, INC.
7835 Broadway Cleveland 5, O.

Equipment You Ought to Know About

Automatic Spot Welding Accessory

Manufacturer: General Electric Co., Schenectady 5, N. Y.

Claims: A new semi-automatic spot and tack welding accessory, suitable for use with all models of its semi-automatic Fillerarc wire drive unit, has been announced by General Electric's Welding Dept.

Available in kit form or as a factory installed accessory on current models, the set consists of a gun adaptor kit and control. The gun kit includes locating plates for butt corner and fillet welds, and can also be adapted for other configurations.

The controls are mounted permanently on a steel door that replaces the standard door on the wire drive unit. The control door is mounted on existing units by ordinary metal screws, and leads wired into the existing circuit.

The gun adaptor kit consists of a screw-on nozzle and two sets of locating plates for the three basic weld positions. Also furnished are protective plates so that the operator does not need to wear a protective helmet or glasses.

Control for the unit consists of a timer, which can be set for welding times of from 8 to 360 cycles; an on-off switch for the timer; and a slow-fast switch for the speed with which the wire drive is started. With the slow start setting, the striking of the arc immediately brings the wire drive to normal speed. This feature can be used regardless of whether the spot welding attachment is in use.

In the control circuit are the pneumatic time delay relay, the on-off and slow-fast start switches, and a current pick-up relay.

In operation, the operator places the gun in position and pulls the trigger, which starts the electrode wire feed and gas. As soon as the wire touches the work, the arc is struck, tripping the timer, which stops the weld after the pre-set time delay.

Materials Handling Clam Bucket

Manufacturer: Owen Bucket Co., 6095 Breakwater Ave., Cleveland, Ohio.

Claims: Owen is now marketing a new "SCL" wide materials handling clamshell bucket. It features a closing line lead straight through the center plane of the bucket to the first lower sheave. This eliminates the bending of the closing line around the guide sheaves as in conventional block and tackle and lever arm buckets.

All sheaves are of larger diameter and closing line sheaves are grooved for size of rope used. Cable and roller wear is further reduced through the use of longer, larger diameter three-sectional bronze-bushed rollers in the head.

The all-welded crosshead is lighter

Continued on page 47

BID LOW *with help like this . . .*

- **MOST POWER PER YARD . . . most power per pound in its class**
- **MOVES FULL LOADS AT FULL SPEED**
- **WIDE OVERLAP IN GEAR RANGES…for easy shifting, smooth acceleration**
- **CURVED BOWL BOTTOM . . . offset cutting edge . . . for fast, full loading**
- **HIGH APRON LIFT . . . positive, clean ejection**

This is the Allis-Chalmers TS-360 . . . a motor scraper that has proved it can help you handle big, tough jobs on rubber . . . profitably. As bidding gets tougher, be ready with the best . . . TS-360's. Allis-Chalmers, Construction Machinery Division, Milwaukee 1, Wisconsin.

ALLIS-CHALMERS *Engineering in Action*

MANITOWOC 1-YD. 1600
MORE MACHINE FOR YOUR DOLLAR!
Outclasses comparable rigs in every ...important performance feature

	Manitowoc 1-yd. 1600	Competitive 1-yd. Machines					
		A	B	C	D	E	F
Shovel Boom	22'6"	21'	21'	20'	21'	21'6"	21'
Crane Boom	45'	40'	40'	35'	40'	40'	30'
Trench Hoe Boom	22'	24'	21'	20'	20'	24'	19'
Air Controls Available	YES	NO	NO	NO	NO	NO	NO
Weights (in lbs.) Shovel	79,500	63,325	54,670	53,500	57,750	61,000	62,850
Crane	70,300	54,870	53,000	53,400	53,950	53,000	54,300
Dragline	70,580	55,070	53,725	51,700	53,600	53,000	54,100
Trench Hoe	75,415	62,625	52,430	62,000	53,400	61,000	60,400
Rated Capacity at 12' Radius with 45' Boom (Pounds capacity)	40,000	39,000	35,700	36,200	36,500	40,000	34,600
Price Comparison (per pound)	Lowest in its class	9c per lb. higher	11c per lb. higher	7c per lb. higher	12c per lb. higher	14c per lb. higher	10c per lb. higher

You get more for your money with a Manitowoc Model 1600. No other 1-yd. unit in the field offers as much in quality features, gross weight and actual price per pound. Here's a one yard machine with the speed and guts to outperform many 1¼ and 1½-yd. units.

Simply designed, with only 13 gears and pinions assures more useable power from every unit of horsepower; a real heavy weight, with weight where weight is needed; easier maintenance with less downtime; torque converter available for smooth power, precise load handling; completely *self-removable* counterweight (12,000 lbs.) speeds transport between jobs; large, wide crawlers and roller path increase stability; rugged construction throughout keeps machine on the job.

Compare the outstanding advantages of the 1600 with ordinary 1-yd. rigs — contact your Manitowoc distributor for the complete story.

MANITOWOC ENGINEERING CORP., Manitowoc, Wis.

MANITOWOC
SHOVELS 1-5½ YD. Speedcrane CRANES 20-100 TON

New Equipment . . .

Continued from page 44

and stronger than cast steel. The arms are of increased size. To reduce the possibility of arm breakage, gusset plates which are bolted to the fixed arms are recommended for severe service as optional equipment. The center weight is all-welded with sheaves mounted high to avoid contact with material. The open-type sheave block has no pockets or cavities to collect material and is self-cleaning.

Longer hinges, with larger bearings increase the open width of the bucket. This, combined with a flatter bowl which minimizes the crowding action, assures a large load at each grab. Reeving of the 3 or 4-part line is easier and faster, since built-in sheave guards permit reeving without removing the sheaves.

The "SCL" wide materials handling bucket is available in ¾ to 3-yd. sizes.

Lights for Loader

Manufacturer: Pettibone Mulliken Corp., 4700 W. Division St., Chicago 51, Ill.

Claims: Headlights, rear lights and stop taillights are now provided as standard equipment on all three Pettibone Speedall tractor shovel models—the 1¼, 1¾ and 2½-yd. units.

Two sealed-beam headlights at the front and a sealed-beam floodlight at the rear provide full job illumination. A large combination stop and taillight provides an additional safety factor for night work.

White Industrial Diesels

Manufacturer: White Diesel Engine Div., White Motor Co., Springfield, Ohio.

Claims: White has developed an improved series of industrial diesel engines in ratings to 1,025 hp which can operate exclusively on low-cost fuel. The Model 40 Superior engines are available

Continued on page 50

WORKERS RELY ON CROSBY CLIPS

THIMBLES INCREASE ROPE LIFE, SAFETY

Unless protected by a thimble, wire rope can be seriously damaged by heavy lifts that crush the strands at the load point. A light thimble can collapse and damage the rope. For positive rope protection and safety, specify Crosby Laughlin heavy plow steel thimbles with the extra heavy steel section design that stands up under maximum loads. Plow Steel Thimbles are available in sizes to fit ¼" to 2¼" wire rope. Stainless Steel Thimbles are offered in selected sizes.

Rigging a cable way 600 feet in the air demands the best fittings available to protect men and materials. This crew is assured of maximum safety because their work platform is secured with genuine Crosby* Clips. This clip, quickly identified by the "Red U-Bolt*" is the number one choice on every job where maximum safety and holding power is essential. Look for the red U-bolt—you'll see it securing wire rope in every industry! And Crosby is the *only clip* available in sizes to fit every rope from ⅛" to 3"! Proved design and quality controlled manufacture—finest steel, drop forged base, galvanized—results in consistently reliable performance.

From one source, Crosby Laughlin Lebus, you get the world's most complete line of fittings: Crosby Clips and "Load Rated" Blocks; Crosby-Laughlin drop forged shackles, hooks, Missing Links*, turnbuckles, thimbles, and other fittings; famous drop forged Lebus Loadbinders and drop forged Snatchblocks! Your Crosby Laughlin Lebus Distributor is your one stop fittings supplier—see him next time you need *any* fittings!

*REGISTERED TRADEMARK

World's Most Complete Line of Fittings For Wire Rope and Chain

CROSBY LAUGHLIN LEBUS

FORT WAYNE 1, INDIANA

Two NEW BIG BONUS International

with fast-loading, dirt-heaping, clean-

Now...all the advantages of famous International scraper design are available in two new towed scrapers —to turn big International crawler power and traction into *big-bonus yardage*. The new 20 cu yd heaped 4S-85 is matched in weight and capacity with the giant TD-24 to pile up profits on the fill. The 14-yard heaped 4S-55 is a cycle-speeder behind TD-18 heavy-duty pull!

Turn on International crawler power with one of these new scrapers—and watch the dirt boil in freely—compact itself into corners—build up an extra-yardage heap. These new scrapers have *flush-smooth* bowl interiors for *flow-easy* dirt action. You've never seen such fast, easy, big scraper loading! And outside-mounted apron arms insure super-speedy, load-trapping apron action!

Ground-hugging profile and low draft arm connections give these new International scrapers an amazing new load-heaping line of draft—plus greatly increased *all-speed* stability for rough-terrain hauling! Roll-out ejection assures fast dumping, and positive discharge of wet, sticky material!

Study the extra yard-getting features of these new big-capacity scrapers from the new balanced, easy-hitch tongue to the big-target push-block. Ask your International Construction Equipment Distributor for a demonstration.

INTERNATIONAL HARVESTER

INTERNATIONAL Construction Equipment

International Harvester Company, 180 N. Michigan Avenue, Chicago 1, Illinois

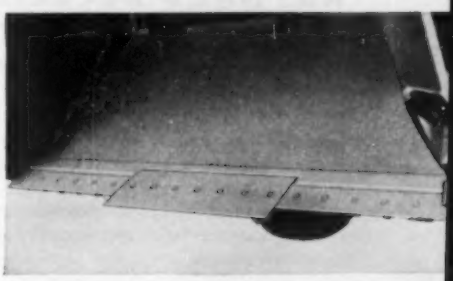
A COMPLETE POWER PACKAGE INCLUDING: Crawler, Wheel, and Side Boom Tractors . . . Self-Propelled Scrapers and Bottom-Dumps . . . Crawler and Rubber-Tired Loaders . . . Off-Highway Trucks . . . Diesel and Carbureted Engines . . . Motor Trucks

New fast-loading bowl design is obtained with a low rear apron contour that gives positive, built-in dirt-boiling action under all loading conditions. Even the wearbars protecting tilting floor hinge are blended into cutting edge bed—to insure smooth dirt flow!

YARDAGE

Scrapers

dumping design!



New cutting edge, where boiling action begins, consists of three equal-length, completely *interchangeable* and *reversible* sections. This design simplifies your parts inventory! And the cutting edge depth can be quickly changed to three different positions to match soil conditions and increase loading efficiency!

BRIEF SPECIFICATIONS:

Model	Recommended Tractor Size	Capacity Struck	Capacity Heaped	Capacity (with Sideboards) Struck	Capacity (with Sideboards) Heaped	Shipping Weight (Approx.)
4S85	TD-24	16	20	19	22	37,200
4S55	TD-18	10	14	12	15	26,360

Exclusive power-saving double ball bearing sheaves maintain correct sheave alignment—provide increased cable and sheave life in these new scrapers. Below, it's the new 20-yard model "85" International scraper being self-loaded by a TD-24 crawler.

Controlled, even spreading is accomplished by positive, power-saving roll-out ejection. High-lift apron, opened by ejector, eliminates excessive sheave travel and complicated reeving. All four axles of these new scrapers are individually replaceable, to minimize downtime, reduce repair expense! Below, the model "55" and TD-18 on the fill.

In a Hayward, there's no contact between the closing mechanism and the gravel or other materials handled. To be sure—this "no contact" feature is only one advantage. But a very important one to you—since it means much less wear, reduced upkeep, and a significant dollar-saving in bucket maintenance.

The Hayward Company, 50 Church St., New York 7, N.Y.

HAYWARD BUCKETS

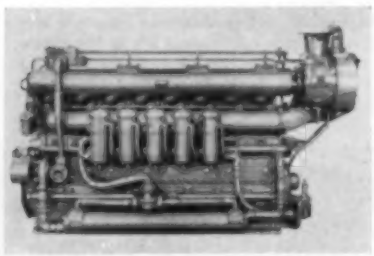
CLAM SHELL • ELECTRIC • ORANGE PEEL • GRAPPLES

famous for performance since 1888

New Equipment . . .

Continued from page 47

naturally aspirated or supercharged. One of the uses of these engines is in heavy equipment. Portable engine generator sets range up to 600-KW capacity.



The heavy-duty models are built as 4-cycle, 6 or 8-cylinder, vertical, in-line engines. Output of the engines ranges from 215 to 1,025 hp. The latter represents nearly a 50% increase over a top capacity of 700 hp in the previous line. The new supercharged engines, however, are the same size as the previous models.

Diesel Pile Hammer, Leads

Manufacturer: McKiernan-Terry Corp., Dover, N. J.

Claims: McKiernan-Terry has developed a new diesel pile hammer and a new line of pile hammer leads. The diesel pile hammer is completely self-contained and requires neither boilers nor air compressors. It is available in two sizes.

The DE-30 model has a 3,000-lb. ram that delivers 45 to 55 strokes per minute with an average energy per blow of 18,000 foot-pounds. It offers most economical driving with 1 to 3-ton piles at bearings from 40 to 90 tons. The DE-20 model has a 2,000-lb. ram that delivers 45 to 55 strokes per minute with an average energy per blow of 12,000 foot-pounds. It offers most economical driving with ½ to 2-ton piles at bearings from 25 to 60 tons.

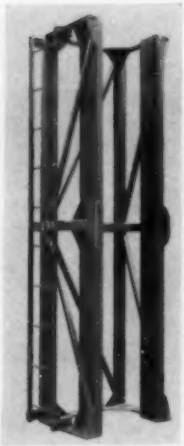
Design of the diesel hammer provides for easy trouble-free operation. A single load line is used for engaging, hoisting, and dropping the ram to start the hammer, and for hoisting and lowering the entire hammer.

A forced lubrication system provides a continuous flow of lubricant to the porous-chrome wearing surfaces. Cylinder and ram are each of one-piece construction, and special alloy steels are used for all parts subjected to high-shock stresses.

Built-in fuel and lubricant tanks have sufficient capacity for over three days of operation. Jobs inaccessible or uneconomical for conventional pile driver can be readily handled by the new pile hammers. Pile damage resulting from driving is extremely small, due to combined preloading, impact, and pushing effect.

The new McKiernan-Terry pile hammer leads, for attachment to crawler and truck cranes, feature all-welded tubular sections that give high strength and rigidity with minimum weight. Five basic lead types are available, to which additions and variations can be made to suit particular customer requirements.

The manufacturer has designed the new equipment as a means of standardizing the possible arrangements of pile hammer leads and to make efficient use of both hammer and leads within job specifications.



Traditionally, pile hammer leads have been cut and fabricated by the contractor or local welding shops. Substitution of leads, which are engineered to perform the pile driving jobs that a particular contractor will undertake, eliminates the need for a crane that is heavier than actually necessary, and requires fewer time-consuming maneuvers.

The new leads are sectionalized for easy transport and erection.

I-H All-Wheel Drive Trucks

Manufacturer: International Harvester Co., 180 N. Michigan Ave., Chicago 1, Ill.

Claims: The line of International "all-

Continued on page 52

"Okay, boys, cigarette break!"

Adams' extra-fast back-up speeds (to 13 mph) save time on one-way work in restricted areas. This "550" can make 5 shuttle "passes" in the time most other graders take to make 4.

Why 15 speeds

in a motor grader?

Because with this wide range of effective speeds you can do more pit and haul-road grading with each machine . . . boost production while cutting costs. 15 combinations of power and speed enable you to make deeper cuts, push bigger loads, work and travel faster than ordinary graders.

That is why modern Adams 80 to 150 hp machines give you 8 standard speeds forward and 4 reverse, plus 3 creeper speeds (optional), for a total of 15 speeds . . . all operating through full constant-mesh transmission. Range of the 123 hp Adams 550, shown in chart below, is typical.

Wider range of forward speeds match power to load

For smoothing and building haul-roads, ditching, clean-up at pit, plant, and stockpile, Adams provides 4 efficient working speeds. Other graders, with 6 forward speeds, have only 3 working speeds. Here's an example of what this means in operation: Adams moves a given load in 3rd gear at 4.6 mph, using full horsepower. With a 6-speed grader and the same load, your operator would have to drop back to 2nd gear, 3½-4 mph . . . or go to 3rd gear where he would have to cut-back the throttle, thereby losing power. It's like that on every operation . . . Adams' 15 speeds get more work done *faster* every day, the year 'round.

Adams' two intermediate speeds, 10 and 14 mph, come in handy for light, fast blading, maneuvering, and climbing tough grades. Travel speeds to 25 mph move rig quickly from job-to-job. Adams foot accelerator and dual-action hydraulic brakes make travel on winding roads, slopes, benches, near other machines, safe, easy, and comfortable as driving a modern truck.

Reverse speeds to 13 mph save time on shuttle grading

Most graders have only 2 reverse gears, with speeds to about 3 and 7 mph. Adams has 4 reverse gears . . . 2 for working, 2 for high-speed back-up. Again, this wider range of speeds gets more work done, uses engine power to full advantage.

But it's Adams' 3rd and 4th reverse speeds that pay the big dividends! Many times your operator works a 200′ to 400′ stretch or even more. It's too short, or the area too confined, to make turn-around practical . . . so he backs-up. Adams' higher reverse speeds of 8 and 13 mph get the grader back to its starting point fast, convert wasted travel time to extra blade-work. These gears also cut maneuvering time, speed back-up to buck snow drifts.

Creeper gears extend grader's working range

Three optional creeper speeds are available, as original equipment, or as an extra which can be added in the field. These gears are in the low-low range of operating speeds, 0.25 to 1.76 mph. They afford a means to concentrate full engine power for ripping up old roadways, pulling stumps, and working through rocks and roots. Creepers eliminate the necessity for "slipping the clutch" at high RPM to get steady power at slow speed . . . reduce shock and clutch wear. Creepers also make it possible to cut more accurate grades, and work in tight places.

190 hp POWER-*Flow* "660"

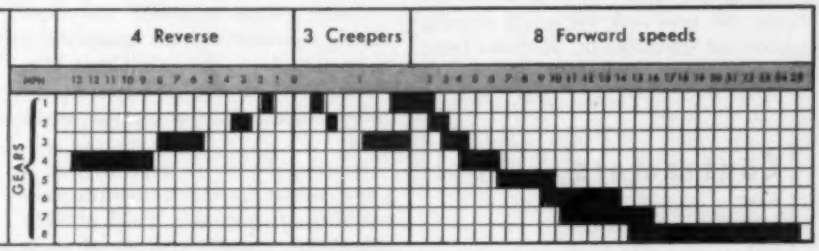
For extra push-power at *all* speeds, Adams POWER-*Flow* 660 with torque converter gives you 27% more engine power, plus the effective work-power of an infinite number of gear ratios, 0.0 to 27.4 mph.

For grader operation at most efficient speeds, specify 15-speed standard transmission or torque-converter drive. Contact us for details on Adams 190, 150, 123, 104, 80, 60 hp graders.

Adams, POWER-*Flow*—Trademark AG-48-M-b

Work speed range
Adams "550"

Speed range is shown between RPM at which maximum torque is obtained, and RPM at which maximum engine horsepower is developed.



LeTourneau-WESTINGHOUSE Company, PEORIA, ILLINOIS

A Subsidiary of Westinghouse Air Brake Company

WHERE QUALITY IS A HABIT

New Equipment . . .

Continued from page 50

wheel-drive" trucks has been expanded through addition of four six-wheel-drive models and two four-wheel-drive models.

The new six-wheel-drive models are the SF-170 (6x6), with gross vehicle weight rating of 22,000 pounds; SF-172, GVW 26,000 pounds; SF-180, GVW 30,000 pounds; and SF-182, GVW 33,000 pounds.

New four-wheel-drive models are the S-170, GVW 19,000 pounds; and S-180, GVW 20,000 pounds.

The six-by-six models are available in four wheelbases: 142, 154, 172, and 190 inches. The four-by-fours are also offered in four wheelbases: 130, 142 and 154 and 172 inches.

Standard rear-end loading height and minimum increase in front-end height with excellent ground clearance are design features of the new models. New design front-drive axle with unique center section, and outrigger-type front spring mountains facilitate lowering of the chassis front-end and provide better stability. Frame reinforcements have been extended forward beyond the front spring mounting brackets for additional front-end strength and rigidity.

Gooseneck Trailer

Manufacturer: Rogers Brothers Corp., Albion, Penn.

Claims: A new Rogers trailer utilizes landing gear type hoists to lower and raise the gooseneck for quick detachment and reattachment. With the front of the frame lowered to the ground,

equipment may be loaded or unloaded quickly with the use of little or no blocking.

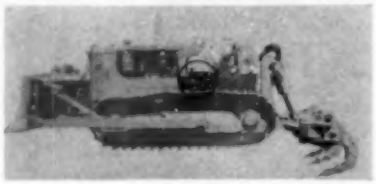
The trailer is available in capacities of 15, 20, 25, 30 and 35 tons.

Direct-Drive Pump for Ripper

Manufacturer: American Tractor Equipment Corp., 9131 San Leandro Blvd., Oakland 3, Calif.

Claims: Designed to maintain constant hydraulic control pressure, a new direct-drive pump for the ATECO tractor-mounted rock ripper is now available for Caterpillar D9 tractors.

The pump is mounted at the engine power-take off just ahead of the clutch and transmission assembly, where it receives constant power while the engine is running. Hydraulic control pressure is thus maintained without interruptions due to clutch action or to speed reduction through the torque converter.



Use of flexible rather than rigid high-pressure piping eliminates joint leakage due to vibration, and permits easy access for tractor clutch adjustment without disassembly.

The direct-drive pump is offered as optional equipment on all new HR-D9 rock rippers, and will be available in kit form for conversion of HR-D9 units now in use.

Case-TerraTrac Tractors

Manufacturer: J. I. Case Co., Racine, Wis.

Claims: Three important new engineering advancements are incorporated in two new heavy-duty Case-TerraTrac crawler tractors. The machines are the 80-hp Model 800 and 100-hp Model 1000.

Heading the list of improvements is a new counter-rotating Terramatic power-shifting transmission, which provides independent power control of each track, both as to speed and direction. This type of control is achieved by po-

Continued on page 54

Contractors School

NAME .....

ADDRESS .....

CITY .....

Learn how to figure labor, material costs on construction jobs. Write for 30 day free trial. CONTRACTOR'S SCHOOL, Box 12, Dallas, Tex.

BENTONE* 34

Grease Manufacturers and Distributors

THE ACME REFINING CO., Cleveland, Ohio
ADAM COOKS SONS, INC., Linden, N. J.
ALEMITE DIV., STEWART-WARNER CORP., Chicago, Ill.
ALLUBE CORP., Glendale, Calif.
THE AMERICAN LUBRICANTS CO., Dayton, Ohio
ARKANSAS FUEL OIL CORP., Shreveport, La.
BATTENFELD GREASE & OIL CORP., Kansas City, Mo.
BATTENFELD GREASE & OIL CORP. OF CALIFORNIA, Compton, Calif.
BATTENFELD GREASE & OIL CORP. OF NEW YORK, North Tonawanda, N. Y.
BEL-RAY CO., INC., Madison, N. J.
THE BROOKS OIL CO., Pittsburgh, Pa.
CASCADE PETROLEUM CO., Denver, Colo.
CATO OIL AND GREASE CO., Okla. City, Okla.
CONSUMERS COOPERATIVE ASSOCIATION, Kansas City, Mo.
CRAWFORD EMULSIONS, Pittsburgh, Pa.
DENS-OIL LUBRICANT CO., Kansas City, Mo.
JAMES W. DOYLE CORP., Detroit, Mich.
FISKE BROTHERS REFINING CO., Newark, N. J.
FISKE BROTHERS REFINING CO., Toledo, Ohio
THE FRANKLIN OIL AND GAS CO., Bedford, O.
GEORGIA-CAROLINA OIL CO., Macon, Georgia
GLOBE GREASE & MFG. CO., Los Angeles, Calif.
GOPLERUD LUBRICANTS CO., Mason City, Iowa
GREDAG, INC., Niagara Falls, N. Y.
HI-WAY REFINERIES, LTD., Regina, Sask., Canada
THE HODSON CORP., Chicago, Ill.
THE HODSON CORP. (QUEBEC), INC., Three Rivers, Quebec, Canada
E. F. HOUGHTON & CO., Philadelphia, Pa.
ILLICO INDEPENDENT OIL CO., Lincoln, Ill.
INTER-STATE OIL CO., Kansas City, Kansas
KEYSTONE LUBRICATING CO., Philadelphia, Pa.
LUBRICATION CO. OF AMERICA, Los Angeles, Calif.
MacMILLAN OIL CO. OF ALLENTOWN, Allentown, Pa.
MAGIE BROTHERS, INC., Chicago, Ill.
MAGNUS CHEMICAL CO., Garwood, N. J.
MANITOBA CO-OPERATIVE WHOLESALE LTD., Winnipeg, Man., Canada
METALCOTE OIL CO., St. Paul, Minn.
MID-STATES LUBRICANTS, Kansas City, Mo.
MIDWEST OIL CO., Minneapolis, Minn.
THE OHIO GREASE COMPANY, Loudonville, O.
OIL-KRAFT, INC., Cincinnati, O.
OIL DISTRIBUTORS OF PHILADELPHIA, Philadelphia, Pa.
ONYX INTERNATIONAL, Jersey City, N. J.
PANTHER OIL & GREASE MFG. CO., Fort Worth, Texas
PANTHER OIL & GREASE MFG. CO. OF CANADA, Toronto, Ontario, Canada
PENN-CREST OIL & GREASE CORP., Long Island City, N. Y.
PENN PRODUCTS CO., DuBois, Pa.
PHOENIX OIL COMPANY, Augusta, Ga.
A. R. PLATING SUPPLY CO., Milwaukee, Wisc.
PRAIRIE STATES OIL & GREASE CO., Danville, Ill.
PRECISION BEARING & TRANSMISSION CO., Omaha, Nebr.
RILEY BROS., INC., Burlington, Iowa
SASKATCHEWAN FEDERATED COOP. LTD., Regina, Sask., Canada
ADOLF SCHMIDS ERBEN S. A., Berne, Switzerland
SERVICE LUBRICANTS, INC., Chicago, Ill.
L. SONNEBORN SONS, INC., New York, N. Y.
SOUTHWEST GREASE & OIL CO., INC., Wichita, Kan.
SOUTHWESTERN PETROLEUM CO., Fort Worth, Texas
SPECIALTY PRODUCTS CO., Jersey City, N. J.
SUNLAND REFINING CORP., Fresno, Calif.
SYRACUSE FIRE BRICK SUPPLY, Syracuse, N. Y.
THREE RIVERS REFINERY, Three Rivers, Tex.
TIDE WATER ASSOCIATED OIL CO., N. Y. C.
TIONA PETROLEUM CO., Philadelphia, Pa.
TOPSALL LUBRICANTS, INC., Kenmore, N. Y.
TOWER OIL CO., Chicago, Ill.
TRANSMISSION EQUIPMENT CO., Pittsburgh, Pa.
TRI-STATE PETROLEUM CO., Philadelphia, Pa.
UNITED COOPERATIVES, INC., Alliance, Ohio
UNITED PETROLEUM CORP., Omaha, Neb.
UNIVERSAL AVIATION SUPPLY, Wichita, Kan.
C. C. WAKEFIELD & CO., LTD., Toronto, Ontario, Canada
THE WARREN REFINING AND CHEMICAL CO., Cleveland, Ohio
THE WAVERLY OIL WORKS CO., Pittsburgh, Pa.
WESTLAND OIL CO., Minot, N. D.

*T.M. Reg.

BENTONE-34®

NO REPLACEMENT OF ANY LUBRICATED PART *IN 5 YEARS!*

"Cut Lubrication Costs 25% With Bentone* 34 Based Grease !"

If you use grease made with Bentone* 34 you can get the same surprising savings made by Cleveland Stevedore Company, Cleveland, Ohio. *Five years ago they put a new shovel to work handling abrasive limestone. In five years of rugged use, not one lubricated part has required replacement!* Their cost figures show a saving of 25 per cent on lubrication, because they use only a grease compounded by using Bentone 34. The heavy-duty ring gear needs lubricating only once a month. Specify Bentone 34 greases on your equipment and cut maintenance costs.

FIVE WAYS YOU SAVE WITH BENTONE *34 GREASE

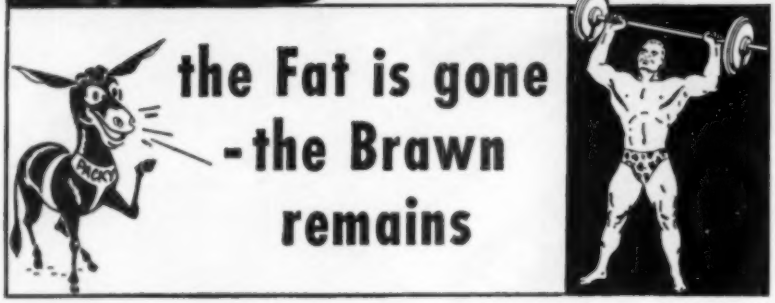
1. Will not melt.
2. Repels water.
3. Adheres to metal.
4. Pumps easily.
5. Less consumption.

BENTONE* 34
FOR MULTI-PURPOSE GREASE

* TRADEMARKS REGISTERED

For additional information contact your local supplier as listed on adjoining page or write

NATIONAL LEAD COMPANY • BAROID DIVISION
P. O. BOX 1675 HOUSTON 1, TEXAS



Judicious use of alloy steel, to produce a lightweight trailer with more than adequate strength is a Rogers accomplishment in the popular LT Model.

Attractively priced, it meets the demand for more payload per pound of trailer weight.

Available in 15, 20, 25, 30 and 35 ton capacities; it is similar in general design and equipment to Rogers standard models.

*One of several Rogers *TILT-DECK Rogers trailers.*

*Trademark Registered

Experience Builds 'em ROGERS Performance Sells 'em

ROGERS
LOW BED — HEAVY DUTY
TRAILERS

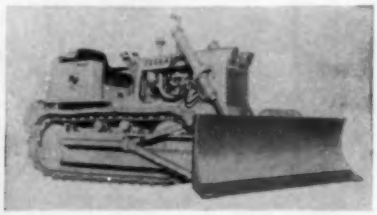
ROGERS BROS. CORP. ALBION, PENNA.

Export Office: 50 CHURCH ST., NEW YORK 7, N.Y., U.S.A. *Cable Address:* Brosites

New Equipment . . .

Continued from page 52

sitioning four hydraulic clutches on either side of the center input shaft, giving the transmission both high and low speeds plus forward and reverse on each side. The machine can make a fast 360° spin-turn practically within its own length—with one track driving forward and the other in reverse.



The 80-hp and 100-hp models both have four speeds forward up to 6 mph and four reverse speeds up to 7 mph. The operator can change speeds or direction instantaneously "on-the-go" without touching a master clutch or stopping to shift gears. The 80-hp model develops more than 20,000 pounds of drawbar push or pull under ideal tractive conditions. The 100-hp model produces a maximum pull of 24,000 pounds.

The second major feature is torsion bar track suspension, which makes it possible for each track to oscillate freely over irregularities in the ground surface. One track can be run onto an obstacle 12 inches high and the other track will remain flat on the ground with the loader bucket or dozer blade remaining perfectly level.

The third feature of the new models is a two-point centralized system for lubricating the lower track wheels.

The new Case-TerraTrac crawlers are available with a complete line of matching equipment, including 1½ and 2-yd. loaders with over 9-ft. dumping clearance; a new angledozer that can be angled right or left hydraulically from the operator's seat; and a new bulldozer that can be tilted hydraulically for ditching and road-crowning.

BUCYRUS ERIE

Your kind of machine...

the new 30-B

MODERN, PROVED DESIGN

The 30-B offers you proved, advanced design features that have made Bucyrus-Erie crane-excavators outstanding performers on all types of work.

Parts are simple, generous in size, few in number—with plenty of strength for dependable service without unnecessary weight to reduce working efficiency.

Air controls are easy to operate, conveniently placed, accurate. Hoist, crowd or drag, swing or propel, and steering clutches, as well as digging and swing brakes and dipper trip are air controlled.

Loads are distributed properly between upper and lower works by six conical hook rollers—two equalized pairs in front and two singles in rear. Precise machining, heat treating and flame hardening provide smooth rotation and long life.

Special greasing system, with remote control located at operator's position, for greasing swing pinion and rack; grease fittings grouped to save time.

TAILORED TO YOUR NEEDS

Choice of crawler mountings—five different sizes of crawlers and treads to fit requirements. Also, Transit Crane on rubber-tired carrier.

Power and drive options—crawler-mounted 30-B offered with gasoline, diesel (direct or torque converter drive) or single motor electric power.

Transit Crane—gasoline or diesel, 35-ton capacity.

Five front ends—both crawler machine and Transit Crane fully convertible to shovel, dragline, clamshell, crane, dragshovel.

Extra equipment for special jobs—includes various-length crane booms and jib extensions, independent propel, third drum unit, cathead, power controlled lowering on main hoist line.

Let your Bucyrus-Erie distributor give you all the facts on the all-new 30-B, show you why it is the *right* machine for your job. See him soon—or write for complete details. 318E57C

BUCYRUS-ERIE COMPANY

SOUTH MILWAUKEE, WISCONSIN

11 rock-speeding PAYHAULER® TRUCKS star in seaway's biggest, single show!

8 other International® rigs help move 2,451,000 cu yd of rock and earth in $14½ million lock construction!

Eleven International "95" PAYHAULER trucks...because of their high speed, big pay-capacity and around-the-clock endurance...are playing the starring roles in the St. Lawrence Seaway's biggest, and perhaps toughest, single show!

The PAYHAULER units are sparking a demanding monthly production schedule of 120,000 yds of rock and 100,000 yds of common earth. The scene is United Waterways Constructor's $14½ million contract of the upper Beauharnois lock construction and channel excavation near Montreal, Quebec.

International TD-24 crawler tractors, TD-14 Skid Shovels, and a "75" PAYSCRAPER® are also vital producers in the moving of the total required 1,461,000 yds of rock and 990,000 yds of earth. Lock completion is scheduled for December, 1958.

PAYHAULER units have also been moving most of the rock on a lower Beauharnois lock. On a similar shorter-haul rock job in the midwest recently, two identical PAYHAULER units maintained a production average of 2,400 cu yds per day!...And here on the seaway, with average 4,000-foot one-way hauls, PAYHAULER units' high speed, next-to-automatic Torqmatic brake control, and minute-saving, easy-to-heap big capacity are cutting cycle time to a minimum and bringing home maximum loads as well.

The rugged PAYHAULER units on the seaway job are standing up to the toughest test in their spectacular career. They're working around the clock, 5 days per week, hauling mostly rock but also proving themselves in wet, job-fouling mud and on slippery, water-soaked lock floors.

Success on the seaway and on other tough jobs the country over is proving International PAYHAULER units to be what construction men themselves asked for...a big-capacity, high-speed hauler with low downtime and operating costs. See for yourself. Try an International PAYHAULER unit on your job.

TON-SIZED ROCKS go up . . . then down into fill in 12 seconds. Two-stage hydraulic hoist provides full-time power control. Hydraulic snubbing assures over-center dumping, gentles body return.

38 MPH SPEEDS keep three or four PAYHAULER units on haul road at all times. Hand-operated Torqmatic brake gives accurate control for safe, high-speed travel on congested haul roads. TD-24 tractor spreads rock for fill at railroad diversion.

MAXIMUM SHOVEL OUTPUT on upper Beauharnois lock construction is maintained by fast, easy-loading International "95" PAYHAULER units. High tensile steel sides, triple section bottom, super-duty "spring cushions" plus strongest frame in "95's" class stand rock-shock!

Construction details St. Lawrence Seaway Project #33

Project length	5,000 feet	500,000 yd rock	aggregate plant
Width of lock excavation	60 to 150 feet	270,000 yd rock	structure fill
Depth of lock excavation	34 feet	70,000 yd rock	railroad diversion
Approximate use and disposal of excavated material:		60,000 yd rock	yard areas, construction roads
40,000 yd brown clay	dyke construction	15,000 yd rock	rip-rap and dykes
400,000 yd earth	random fill	15,000 yd rock	service roads

INTERNATIONAL HARVESTER

INTERNATIONAL® Construction Equipment

International Harvester Company, 180 N. Michigan Avenue, Chicago 1, Illinois

A COMPLETE POWER PACKAGE INCLUDING: Crawler, Wheel, and Side-Boom Tractors . . . Self-Propelled Scrapers and Bottom-Dumps . . . Crawler and Rubber-Tired Loaders . . . Off-Highway Trucks . . . Diesel and Carbureted Engines . . . Motor Trucks

NOT in the Contract

A somewhat inebriated gentleman was walking down State Street and did not know his location. He turned to a passerby and said, "Mister, where am I?" The passerby answered, "You are at the corner of State and Madison streets." The inebriated gentleman said, "Never mind the details, what city?"

Suzie brought home her college roommate, a gorgeous blonde. That Vassar duplicate of Marilyn Monroe was introduced to Suzie's great grandfather.

"Marilyn," Suzie introduced, "Grandpa's in his nineties!"

"My early nineties," great-grandfather amended, with a gleam in his eye.

Two Boston ladies were sightseeing in California on a very warm day.

"It never gets like this in Boston," remarked one, fanning herself rapidly.

"Of course not," returned the other. "But you have to remember that here we are 3,000 miles from the ocean."

Cora: "I hear you have accepted Joe. Did he happen to mention that he had proposed to me first?"

Laura: "Not specifically. He did say he had done a lot of foolish things before he met me."

The couple were expecting another child, and it appeared that the problem of breaking the news to their five-year-old son could be put off no longer.

"Son," the father said, "the stork has been flying above our house for some time now, and I notice that he has been swooping pretty close to the housetop during the past few hours."

"Gosh," replied the son, "don't tell Mother. It might scare her, and she's pregnant you know."

A man was very indignant at being arrested. He staggered into the police station and before the captain had an opportunity to say anything he pounded his fist on the desk and said: "What I wanna know is why I've been arersted!"

"You were brought in for drinking," answered the captain.

"Well, thass different—thass fine—let's get started."

"Doctor," asked the patient anxiously, "if I let you operate on me, can you promise that I'll be playing the piano in two weeks' time?"

"Well, I can't promise the piano," returned the doctor cheerfully, "but the last patient on whom I performed this operation was playing a harp within 24 hours."

There was the octogenarian who married a 19-year-old lovely and died on his honeymoon. It took the mortician three days to get the smile off his face.

In a mental institution one patient suffered under a compulsion to tear off his clothes. The doctor offered him a reward of 10 cents for each day he refrained from doing so.

The man kept his clothes on through Monday, Tuesday, Wednesday, Thursday, Friday and Saturday, but on Sunday tore them off again. The doctor chided him for his relapse.

"Well," retorted the astonished patient, "you didn't think I was going to work on Sunday, did you?"

"What do you take for your insomnia?"

"A shot of bourbon at regular intervals."

"Does that make you sleep?"

"No, but it makes me happy to stay awake."

Motorist: "I ran over your cat and want to replace him."

Housewife: "Well, get busy. There's a mouse in the pantry right now."

The baldheaded barber was trying to sell his customer a bottle of hair tonic.

"But how can you sell it when you have no hair yourself?" he was challenged.

"Nothing wrong with that," came the answer. "I know a guy who sells brassieres."

EXCAVATING ENGINEER

"Just how did you phrase that order for a ¾-yd. shovel?"

How to put limestone and gumbo in their place

THIS is heavy going on a new section of four-lane U. S. 80 just east of Ranger, Texas. Collins Construction Co. of Austin put in 7.8 miles here and they handled 395,000 yards of material doing it. A lot of that was rock. And a lot was limestone and gumbo.

For this sort of heavy grading, Collins called in their CAT* No. 12 Motor Grader. "Finest all-around grader I ever saw," says veteran operator V. W. Nichols.

Notice that operator Nichols sits down to handle his No. 12, even in rough stretches like this. If an operator has to stand to see his work, he tires much quicker, no matter how good he is. The operator of a No. 12 enjoys the convenience of in-cab starting, too, and power steering, and the exclusive Caterpillar accelerator-decelerator. Most of all, he enjoys the assurance he's at the controls of a tough, reliable machine that's *built to do the hard work.*

Backbone of the No. 12 is the strongest frame in any motor grader now on the market. Special channels make it that way. Box section circles increase its durability, as do its box-type drawbars. And the engine is of the same hardy breed—clutch, transmission, final drive are built to take heavy motor grader service.

Other features help explain the No. 12's popularity with operators and owners, too. Fast, accurate mechanical controls. Anti-creep brakes. Blade maneuverability that lets you swing from ditch cut to bank cut in less than a minute without adjusting links. Your Caterpillar Dealer will give you full details—and a demonstration, any time. He's ready with expert service, also—and parts you can trust.

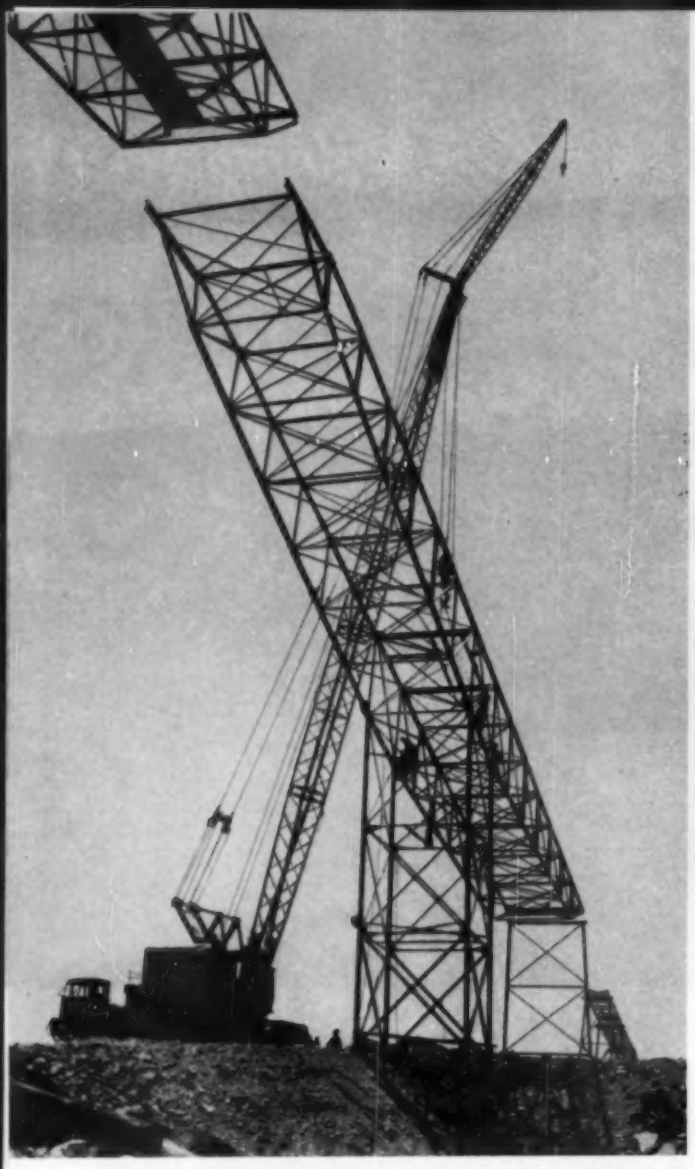
Caterpillar Tractor Co., Peoria, Illinois, U. S. A.

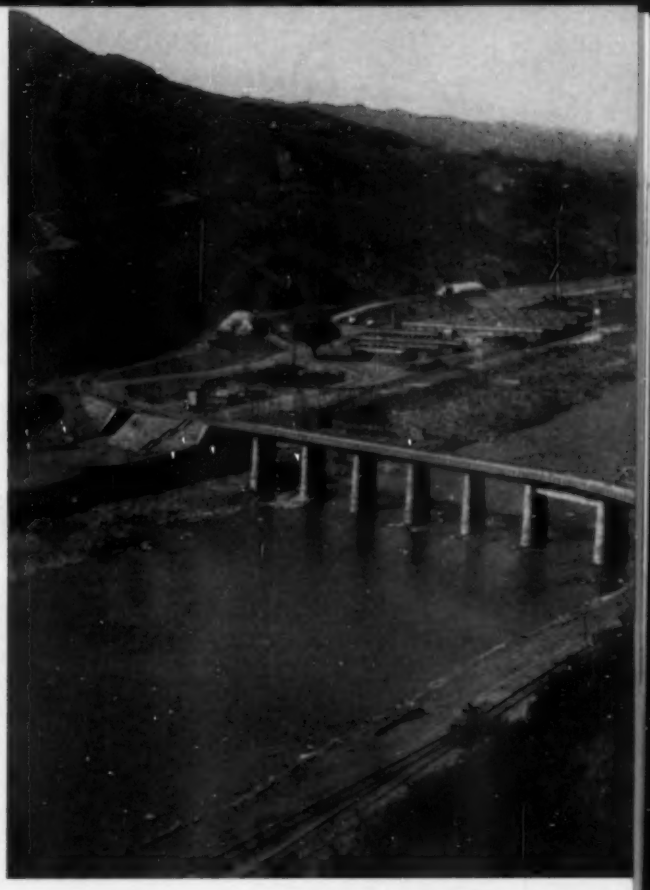
CATERPILLAR*

*Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

Diesel Engines • Tractors • Motor Graders • Earthmoving Equipment

WANTED—
THE HARD WORK





(Above) A truck crane erects conveyor bridge. (Below) A 2½-yd. shovel loads gravel and cobbles for concrete mix.

the same grizzly-hopper-conveyor arrangement is used for moving the material on. To dig below water level at Niella, Slocum is using a 1201 Lima dragline.

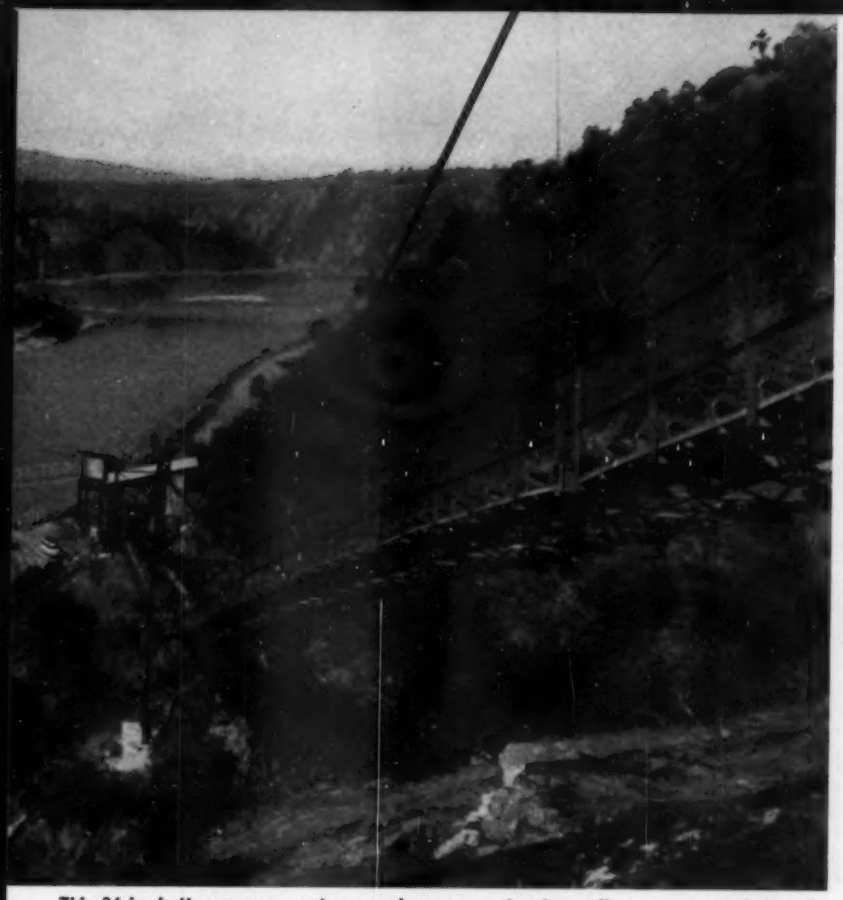
Niella is the pit long on rock in the ¾ to ⅜-in. size. Since this fraction passed the grizzly, it naturally stays in the pile. Niella is also long on bigger boulders, and most of these stay behind, rejected by the grizzly screen, as at

Bhakra . . .

Continued from page 25

on a traveling grizzly. Oversize rock, not suitable for the concrete mix is thus rejected immediately in the pit. What passes through goes into a hopper, where a belt elevator takes it away to Euclid hauling units. The Eucs take the material to a dump hopper, which in turn feeds a conveyor leading to the Niella surge pile. All belt conveyors were furnished on the basis of a job-prepared design by the American firm of Hewitt-Robins, Stamford, Conn. Lima 1201's, a dragline and a shovel, are also being used at Niella for digging aggregate above and below the water line.

The Niella pit uses a Ruston-Bucyrus 54-RB shovel for loading aggregate, and



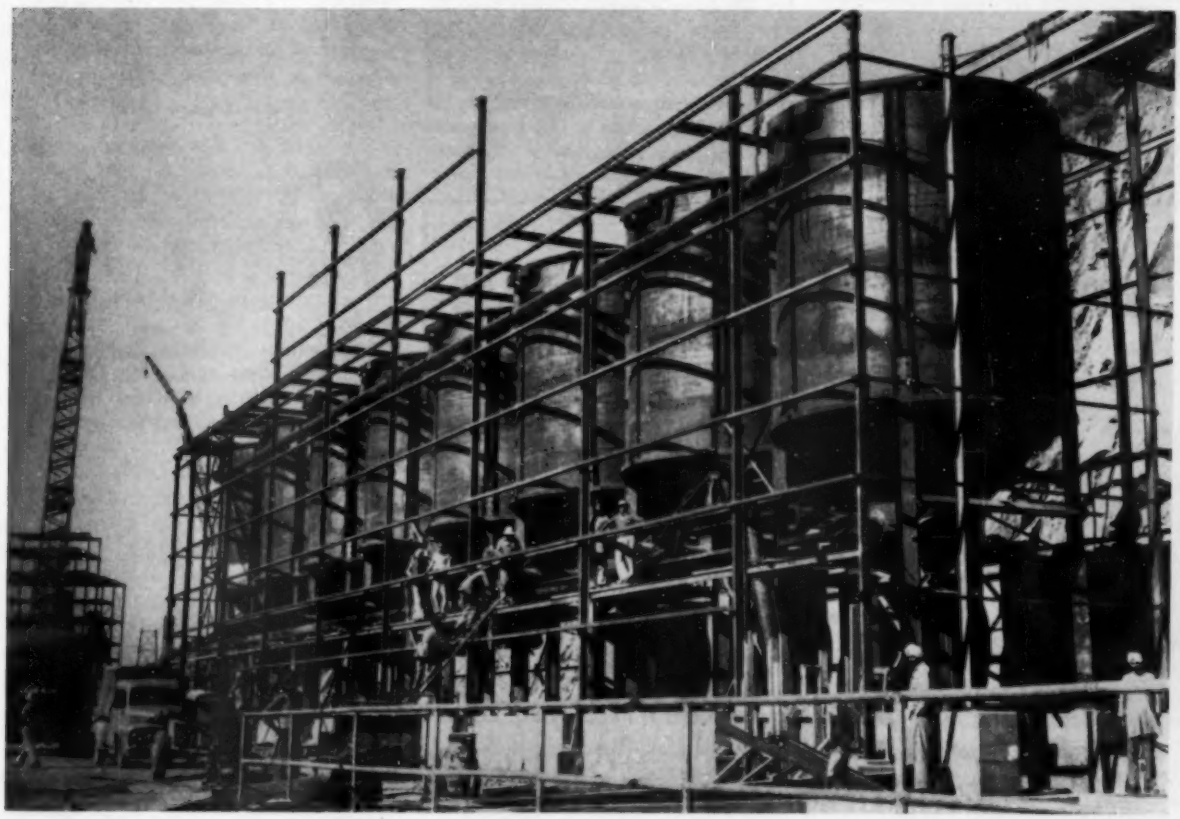
This 36-in. belt conveyor system carries aggregates two miles across rough terrain to classifying plant. (Below) Turban-wearing Indians erect aggregate cooling silos.

Fatehwal. Some boulders at Niella are to be crushed, however, as needed in the mix. Slocum is pulling material from the Fatehwal and Niella surge piles by feeder gate to place the proper blend on a 36-in. conveyor system leading to a classifying plant two miles away.

Playing the game cagily, Slocum left enough excess Niella rock in the blend to allow three Symons cone crushers to make the coarse sand particles which are deficient at Fatehwal. In his classification plant are Robins screens, four sand classifiers, and three cone crushers. Sand made by the cone crushers goes right back into the surge pile, so that a steady flow of properly blended sizes can be assured.

The refrigeration plant used at Bhakra is the same one which Slocum used at Bull Shoals dam in Arkansas. Vilter ammonia compressors turn out artificial ice through Vogt tube machines, and make the many tons of ice water which are used in "dunking" the aggregates. Alternate hoppers of aggregates are immersed in ice water, drained, and then used by the concrete plant. Ice water also is being used in the mix.

Slocum placed his mixing plant at Elevation 1365, from which point about five-eighths of the total concrete volume will be placed. Then the plant will



be moved up to Elevation 1594 to finish the structure, which tops off at Elevation 1700.

Placing cranes are Slocum's beloved double cantilevers. Two American Hoist & Derrick Co. double cantilever cranes are in use, along with three American revolvers, one of which will be used to place the concrete in the powerhouse. These great machines are placed on trestles up to 320 feet high, and are so arranged that they can pass each other! Slocum figures he'll place between 90,000 and 120,000 cubic yards per month under Bhakra's conditions. The concrete mixing plant is a 1,350-yd. Johnson automatic batcher, which discharges to four Koehring 4-yd. mixers.

Diesel-Electric Locomotives

Bhakra boasts 11 of the finest concrete locomotives ever built. Their bodies are German-made. Their control units, which are mounted on each car, are General Electric, with Caterpillar D8800 diesel power. With many speed ranges available, the cars will carry four loaded 4-yd. Blaw-Knox concrete buckets and have one empty platform to take an empty from the crane under which they spot themselves. Slocum, incidentally, is building his concrete buckets and cantilever-type steel forms in India, according to Blaw-Knox designs under a royalty basis.

Through close work with American Hoist & Derrick Co. and with General Electric, some real standardization has been achieved on the big concrete placing cranes. Every motor on revolvers and cantilevers is interchangeable, and for the first time the revolving cranes have been DC powered, with Ward Leonard controls. The 300-hp motor generator sets on these machines give them power to spare. The swing motor on a revolving crane is interchangeable with the rack motor on a cantilever. Hoist and travel motors are the same. And Slocum insisted that safety devices be worked out so that the operator, no matter how inexperienced, couldn't pull a bucket up through a head block.

A huge steel penstock for the power plant is transported along the bank of the Sutlej River on a low-bed trailer with the aid of a crane. Project is to be completed in 1960.

Air-Conditioned Cabs

The cabs of the revolving cranes were placed far down for easy vision. Each cab is fully air conditioned, and the operators sit comfortably in DoMor office chairs. About the time they get comfortable, the gravelly, rasping voice that every worker in Bhakra has come to know is likely to float up from the trestle yelling, "Damn it, you've got to get more 'second conscious'! Cut five seconds off that cycle and maybe we'll get this dam built before you grow old and die."

Slowly but surely Bhakra is rising. A large amount of concrete is already in place. Headquarters yards, repair yards, haul roads and connecting roads are in, and in right. Every job needs them, and Slocum got that done first so he could work when things were ready. There are two Manitowoc 3000's for general roustabout crane use, a Washington crane at the Niella yard, and a Colby crane at the Nangal yard. A rail-

Continued on page 64

SURPLUS EQUIPMENT FOR SALE

3 — Model C Tournapull Roadsters

1 — Model HD-19 Cummins Tractor

1 — Model TD-24 International Tractor

This equipment has been used in our ore mining operations at Lone Star, Texas. This equipment is in running order exclusive of the HD-19 tractor which has a broken crankshaft. Equipment will be sold on "as is and where is" basis. For full information, please contact John M. Morris, Vice President, Purchasing, Lone Star Steel Company, P. O. Box 12226, Dallas, Texas.

One of the nation's major sources of titanium, this open-pit has produced 15,000,000 tons of ilmenite-magnetite ore and 8,700,000 tons of concentrates since its start in 1942. Over 17,000,000 tons of rocky overburden have also been removed. Entire deposit is 1800 ft. long, 900 ft. wide; averages 35% magnetite, 32% ilmenite, 10% feldspar and 23% iron silicates. All ore and waste must be shot...drill holes are sunk with a 42-T churn drill using a 9 inch bit, to 39 ft. deep. From 350 to 500 lbs. of 90% gelatin dynamite are used per hole...each lb. breaks up 3½ tons of waste and ore. A 4-yd. shovel, together with four 22-ton rear-dump trucks, loads all waste ...two 2½-yd. shovels, together with seven 15-ton trucks, move the ore. Finished ilmenite goes to processing plants, for conversion into titanium dioxide pigments for paints, paper, rubber, ceramics, and other substances. Magnetite concentrate is both converted to sinter and shipped raw to various iron, steel, refractory, and cement plants.

How rubber-tired tractors cut costs for one of world's largest titanium mines

In the heart of the Adirondack Mountains in upper New York State lies a mine which is one of the world's largest producers of titanium. From a pit 900 ft. x 1,800 ft. comes 3,200,000 tons of ore and waste yearly. Two rubber-tired Tournatractors shuttle back and forth to handle tractor work at pit, stockpiles and plant.

1 tractor cleans around 3 shovels, 1 dropball, 11 trucks

One of these 17 mph 208 hp units is assigned mainly to pit and dump clean-up. At the pit, it cleans around *two* 2½-yd. shovels, *seven* ore-hauling trucks, *one* 4-yd. shovel, *and* a rubber-tired dropball crane. At the dump, a mile away, it cleans up for a fleet of 4 end-dump trucks. Rig shuttles continuously between assignments. A 300 ft. trip between shovels takes as little as 20 seconds ...the mile from pit to dump takes 3 to 5 minutes. Despite this busy schedule, tractor finds time to move air compressors, drills, and other pieces of pit equipment.

Another dozes magnetite weighing 4800 lb./yd.

The second Tournatractor is used primarily on the magnetite stockpile. Here it dozes concentrate within range of clamshell that loads railroad cars, or else dozes directly into a hopper. Rig's blade often carries 2½ cubic yards of material — weight *6 tons!* When needed, this tractor moves to other stockpiles to doze ilmenite concentrate or coal. Occasionally, it spots railroad cars in the sintering plant area. As needed, it cleans spillage from roads and haulage ways, and does other odd jobs. Wherever it goes, rig's low-pressure tires do no damage to footing. They roll easily over pavement, railroad tracks and ties.

Each costs $1 less per hour to operate than crawler-tractors

On shovel clean-up jobs, owners report Tournatractors outproduce the biggest crawler-tractors, 2-to-1. Units usually work at higher speeds and move job-to-job at higher speeds. Tournatractors cost less to maintain, too...4 tires eliminate the headaches of 500 to 600 track parts. Lowered maintenance, plus lower repair and operating costs are proved by accurate figures kept by the mining company. These show cost to operate Tournatractor "averages" approximately *$1.00 less per hour than their records of average cost for crawler-tractors.*

You judge its advantages

Tournatractor's lower costs, "go-anywhere" mobility, and fast-working speeds can pay off for you, too! Ask your LeTourneau-Westinghouse Distributor for a demonstration of this versatile machine so you can judge its advantages for yourself!

Tournatractor—Trademark Reg. U.S. Pat. Off.
T-752-M-bw

▼ Dozing stockpiled magnetite, Tournatractor moves up to 2½ bank yards (about 6 tons) per push.

LeTourneau-WESTINGHOUSE Company, PEORIA, ILLINOIS
A Subsidiary of Westinghouse Air Brake Company
WHERE QUALITY IS A HABIT

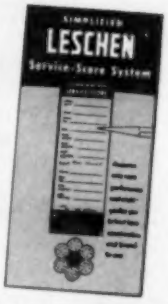
Improving wire rope service with **LESCHEN** HKP *Red-Strand*

How to prove wire rope performance for yourself

There is a difference in wire rope—in types, in constructions, in brands. And using the right rope every time can easily reduce rope costs by 10% to 20% or more.

How do you know which rope is right? First, get good advice. Leschen field men, distributors and Leschen's engineering department can help you make the best choice. Second, prove it out with easy-to-use Leschen Service-Score stickers. They tell you right on the job how you're doing—help you make accurate comparisons.

Keep the score—see the results—and you'll use more Red-Strand Wire Rope. See your Leschen man or write Leschen Wire Rope Division, H. K. Porter Company, Inc., St. Louis 12, Missouri.



Leschen engineering advice and Service-Score Stickers are yours for the asking. Write for fact-folder.

HKP LESCHEN WIRE ROPE DIVISION
H. K. PORTER COMPANY, INC.

Bhakra . . .

Continued from page 62

road staffed by three GE locomotives connects Nangal to Bhakra. The only hopper-bottom railroad cement cars in India—100 units which will handle 22 English long tons or 25 U. S. tons—are owned by the Bhakra project.

Slocum is exceedingly proud of India's aptitude in pushing one of the world's biggest dams toward completion. The way he and his Indian-American crew have advanced Bhakra has commanded the close, friendly support of India's Prime Minister Nehru.

Indian heads in charge of operations include Shri S. D. Khungar, general manager in charge of the Bhakra project, assisted by C. L. Handa, director of design. M. R. Chopra is joint director of construction; S. C. Katoch is in charge of purchasing; and R. L. Khanna is in charge of inspection and layout.

Slocum's 28 American assistants include Einar Skinnarland, who had charge of all design for plant; J. T. Carnahan, excavation superintendent; Carl Knutson, tunnel driving superintendent; Pete Peterson, drilling and shooting; J. M. Estes, mechanical supervisor; Clifford Foster, rigging supervisor; James Cash, electrical supervisor; C. T. Mortensen, carpenter supervisor; and A. C. Daum, assistant supervisor in charge of concrete scheduling and lift sheets.

Consulting board membership has included J. L. Savage, formerly of the United States Bureau of Reclamation; John Hammond; Byram Steele; Dr. Frank Nickell; Dr. Frank A. Banks; M. H. Slocum; Irving Crosby; and an Indian engineer, Dr. A. N. Khosla.

Durango . . .

Continued from page 37

tendent; S. Samuelson, grade foreman; Amos Whiteman, master mechanic; Leonard Pont, crushing foreman; and Marvin Jensen, office manager. D. M. Bayler was the excavation foreman in charge at the difficult rock cut.

J. L. Hutchinson, project engineer, with his competent engineering crew, was in charge of field work at the site for the Colorado Department of Highways. He was responsible through James E. Casey, district engineer, to staff construction engineer, William J. Walsh, and to state highway engineer Mark U. Watrous, who had general charge of design and construction of this heartbreaking mountain highway.

"loading . . . hauling . . . dumping . . . you can't beat 'em!"

That's what Mr. Arnold R. Lyon of Harry Berry, Inc. says about their Mack LRX dumpers. As general manager of their operation in Hopkinsville, Kentucky, Mr. Lyon appreciates the dollar-and-sense value of Mack trucks.

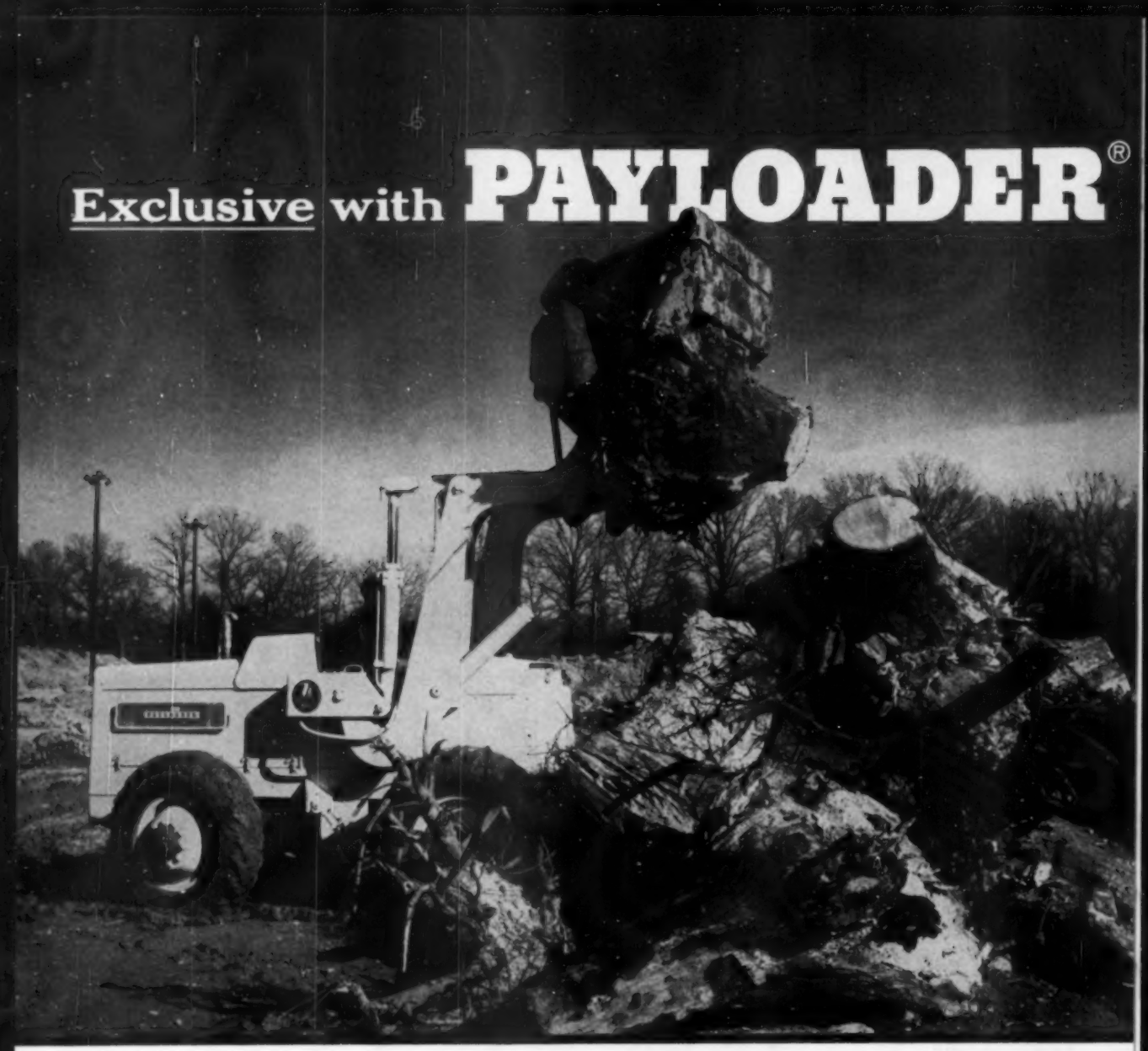
"Since ours is mostly short hauling, the strain from loading, dumping, and steep grades really gives our trucks a tough workout. Moreover, we find that we are able to produce more work with our Macks because their balance, short turning radius, and maneuverability speed up spotting under the shovel and dumping.

"Our Macks haul 16- to 17-ton loads day in and day out . . . averaging 2 gallons of fuel per hour. In 3½ months, outside of routine servicing, we have not had a single second of downtime. But aside from the economy and performance, our drivers like them better than other makes . . . easier to handle . . . better riding . . . greater sense of confidence. Certainly, it's been our experience that you can't buy a better truck than a Mack."

Mr. Lyon has learned about Macks from experience. If you have a hauling job, especially a tough one, why not let your Mack dealer or representative tell you about all the satisfied Mack users in your area. Mack Trucks, Inc., Plainfield, New Jersey. In Canada: Mack Trucks of Canada, Ltd.

MACK
first name for
TRUCKS

4797



DROTT 4-in-1 buckets

The Frank G. Hough Co. is pleased to announce that another valuable attachment has been added to those available exclusively for "PAYLOADER" tractor-shovels. This is the Drott 4-in-1 bucket which, coupled with the power and mobility of the current line of 4-wheel-drive "PAYLOADER" tractor-shovels, gives them greater performance on many jobs, and the ability to handle many operations that usually require special machines.

More than ever before, you get more tractor-shovel when you buy a "PAYLOADER", because you get more tractor-shovel performance and more versatility. They have power-transfer differentials — an exclusive "PAYLOADER" feature that maintains effective traction on mud, gravel, ice and snow. They have no-stop power-shift transmissions and torque converters . . . planetary final drives . . . power steering and 4 wheel power brakes. They have the exclusive bucket motion with 40° tip-back and powerful pry-out action that enables them to dig more, carry more and deliver more . . . to outperform any comparable tractor-shovels.

Your "PAYLOADER" Distributor is anxious to demonstrate what these "PAYLOADER" tractor-shovels and Drott 4-in-one buckets can do for you.

It's a Shovel The four-in-one bucket can always be used as a regular tractor-shovel bucket to dig, carry and dump in the regular manner.

It's a Clamshell Use the powerful clamshell action to clean up small piles, to pick up without tractor travel, to grasp and handle stumps, pipe and timbers fast.

It's a Scraper With slight clam lip opening you have a carry-all scraper that heap-loads itself, carries and spreads thin layers or dumps completely. Strips sod and grades with real accuracy.

It's a Bulldozer Open the clam lip full, and you have a sturdy bulldozer with hydraulic finger-tip blade-pitch control to regulate dozing depth and to discharge sticky material.

help you handle more jobs

OTHER USEFUL ATTACHMENTS

Hydraulic Back-hoes	Land-clearing Rakes
Crane Hooks	Scarifier Teeth
Fork Lifts	Special Buckets
Pusher Plates	Pick-up Street Sweepers
Winches	Rotary Snow Plows
Log and Lumber Grapples	"V" and Blade Plows

The knowledge and experience gained in 35 years, building thousands of tractor-shovels — more than all others combined — is your assurance of superior design, engineering and value when you invest in a "PAYLOADER" tractor-shovel.

SAY "HUFF"

PAYLOADER®

MANUFACTURED BY

THE FRANK G. HOUGH CO. LIBERTYVILLE, ILL.

SUBSIDIARY—INTERNATIONAL HARVESTER COMPANY

THE FRANK G. HOUGH CO.
708 Sunnyside Ave., Libertyville, Ill.

Send full data on 4-wheel-drive "PAYLOADER" models with Drott 4-in-1 Buckets as checked:

☐ model HO 2¼ yd. ☐ model HH 1½ yd.
☐ model HU 1 yd.

Name _____

Title _____

Company _____

Street _____

City _____

State _____

33

"REAL PRODUCTION WITH HEAVY TOOLS"

says Owner* of DOUBLE-DUTY 20-W Drill

Stepping from its natural task of water well drilling, this Bucyrus-Erie 20-W drilled holes to blast quarry rock for dikeline-ballast work along the lower Missouri River. Swinging a 1,400-lb. tool string, it sank 5-⅝-in. holes from 30- to 95-ft. depths, averaging five feet per hour in bedded limestone, flint and chert. Holes were spaced 21 feet apart and up to 18 feet from the face, some in multiple rows. Excellent toe breakout was obtained without secondary drilling.

Says owner: "We like the 20-W's ability to handle sufficiently heavy tool strings to get real production in this quarry work. Drilling for contractors must be faster than for average water well owners."

You, too, can count on all-steel welded Bucyrus-Erie 20-W and 22-W drills for double-duty — blast holes or water wells. Both have plenty of spooling capacity for the deeper drilling generally required in water well work. For complete information, write today. 65W56

* *Name on request.*

BUCYRUS ERIE SOUTH MILWAUKEE WISCONSIN

New Trade Literature

Subject: **Drott Literature**

Content: International Harvester has released six new pieces of literature on Drott Skid-Shovels and attachments. A 16-page general catalog covers the entire International Drott line, with on-the-job photos showing units utilizing various attachments, and diagrams illustrating the latest improvements. The other items are an 8-page catalog describing the several sizes of log and pulpwood Skid-Grapples available, a 4-page bulletin on grubber blades; and single-page specification sheets on Bullangledozer blades, rock forks, and scarifiers. The literature is numbered as follows: K-656 for the 16-page general catalog; A-100, 8-page Skid-Grapple catalog; A-200, grubber blade booklet; A-400, Bullangledozer blade spec sheet; A-500, rock fork sheet; and A-300, scarifier sheet.

Where to get: International Harvester Co., 180 N. Michigan Ave., Chicago 1, Ill.

Subject: **Roller Bearings.**

Content: A new 72-page catalog on Shafer self-aligning roller bearings has just been published by the Chain Belt Co. The new catalog contains specification and data pages on all models of Shafer units. These various models have shaft sizes which range from ¼-in. to 7-in. Included in the piece are completely revised engineering data and new load rating tables.

Where to get: Chain Belt Co., Milwaukee 1, Wis.

Subject: **Drill Shop Equipment**

Content: An 8-page bulletin presents Ingersoll-Rand bit-and-rod shop equipment for bit and steel reconditioning on large-scale rock drilling jobs, such as tunneling, mining, road and waterway building and quarrying. The I-R line includes jackbit grinders for small and large Carset bits and small steel bits; drill steel and bit furnaces for heating to forging temperature and for tempering; and drill steel sharpeners, steel cutters and shank grinders. Ask for form 4187.

Where to get: Ingersoll-Rand branch offices or Ingersoll-Rand, 11 Broadway, New York 4, N. Y.

Subject: **Welded Chain**

Content: A new catalog on welded chain, welded chain assemblies, and accessories has been published by the Bolt and Chain Div., Republic Steel Corp. The 62-page catalog describes and illustrates over 25 different types of welded chain and chain assemblies, plus a complete line of accessories. Specifications are up-to-date. Types of welded chain listed include Proof Coil, BBB, Republic Alloy, High Test, and a variety of other standard and special chain types. The first seven pages of the book form a general information section on welded chain, with important points on its care and maintenance. Ask for form ADV-701.

Where to get: Advertising Div., Republic Steel Corp., 3100 E. 45th St., Cleveland 27, Ohio, or district offices.

Subject: **Semi-Automatic Welder**

Content: A six-page booklet on the AMSCO semi-automatic welder for hardfacing contains cross-sectional and cutaway drawings of the machine and its component parts and explains how it operates. Included is a section on the new AMSCO tubular electrodes for semi-automatic manganese steel build-up and hardfacing, plus a list of their applications in different industries. Ask for bulletin No. 6-56.

Where to get: American Manganese Steel Div., Dept. A. Chicago Heights, Ill.

Subject: **Machinery Lubricants**

Content: A 6-page bulletin entitled, *Keystone Specialized Lubricants for Contractor Equipment*, deals with application of Keystone oil and grease to 24 different types of heavy equipment used in earthmoving, strip-mining, quarrying, roadbuilding, excavating, logging, dredging, erecting and allied fields. Fourteen photos illustrate these applications. A specification chart of "semi-solid" lubricants gives working range, melting point, penetration, moisture repellence and body

characteristics. A chart of "liquid" lubricants lists such data as flash and cold tests, and SAE numbers. Ask for bulletin BU-58.

Where to get: Keystone Lubricating Co., 3100 N. 21st St., Philadelphia 30, Pa.

Subject: **Nordberg Grizzly**

Content: A four-page bulletin describes Nordberg's Symons vibrating bar grizzly, a high capacity scalping unit for large tonnage operations dealing with feed size up to 30 inches and larger. Top and side view line drawings offer pertinent dimensions of the grizzly which has a capacity of 1,000 tons per hour. The grizzly is especially recommended for scalping service with materials that are wet, sticky or gummy. Ask for bulletin 261.

Where to get: Nordberg Mfg. Co., Milwaukee 1, Wis.

New Movies . . .

Subject: **Wire Rope**

Content: A new sound-color film, *Quality Unlimited*, describing the manufacture of wire rope, has been made available by the Wickwire Spencer Steel Division of The Colorado Fuel & Iron Corp. The 30-minute film follows all the operations in the production of wire rope from basic steel making to the testing of the finished rope. Special emphasis is given to the chemical and physical tests that accompany each step in the manufacturing process. Applications and proper care of wire rope also are shown.

Where to get: The Colorado Fuel & Iron Corp., 575 Madison Ave., New York 22, N. Y.

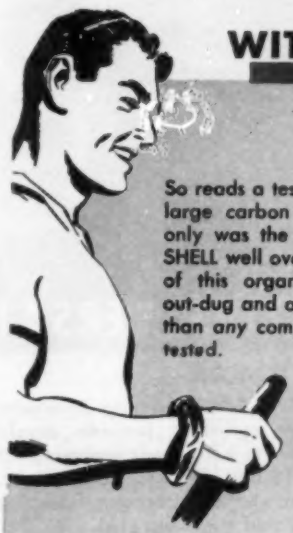
Subject: **Crushed Stone**

Content: New York Trap Rock Corp. has completed a color motion picture, *Mountain to Main Street*, which is a documentary on the production and use of crushed stone. The 16mm sound film describes quarrying, stone processing and shipping, then moves on to tell of the many important uses for this basic commodity. Spectacular aerial views of quarries, stone barges on the Hudson River, and major construction projects in the New York area are among the film's highlights.

Where to get: New York Trap Rock Corp., 230 Park Ave., New York 17, N. Y.

UNLOAD 1600 TON BARGES 46% FASTER

WITH KIESLER BUCKET!



So reads a testimonial from a large carbon producer. Not only was the KIESLER CLAM SHELL well over specifications of this organization, but it out-dug and out-loaded more than any competitive buckets tested.

There IS a reason: The KIESLER CLAM SHELL DEPENDS ON THE PROVEN PRINCIPLES OF LEVERAGE, NOT ON DEAD WEIGHT (COUNTER-WEIGHTS) FOR DIGGING ABILITY. The leverage of the 2-lever-arms exerts its powerful force directly to the shells and cutting edges, thus digging-in for a greater payload every time. And this maximum in power and performance is accomplished with a minimum amount of cable and reeving. The name KIESLER on your bucket is an assurance of superior performance and high-quality construction; backed up by over 64 years of bucket-manufacturing experience!

PROMPT SERVICE AVAILABLE

Factory service on Kiesler Buckets and as an accomodation on other makes, too. Whatever the problem, feel free to call on us.

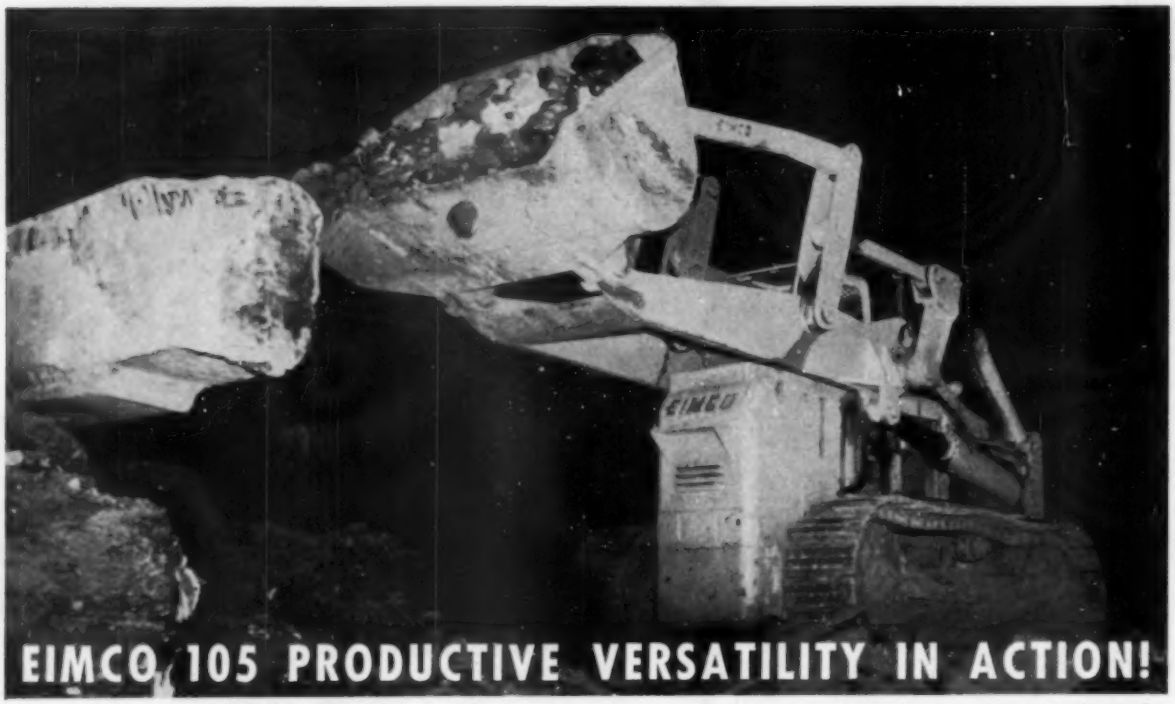
GUARANTEE

Kiesler Buckets are guaranteed to outperform and do a bigger day's work than any other Bucket of equal weight, width, and size, when properly reeved and operated.

JOS. F. KIESLER CO.

KIESLER Since 1892

944 W. HURON ST. • CHICAGO 22, ILL. • MONROE 6-7144



EIMCO 105 PRODUCTIVE VERSATILITY IN ACTION!

NEW! FRONT END LOADER

Here's the latest addition to the 105 wide-range family of rugged earth-moving tools.

In loading applications where physical and haulage conditions make its use more practical . . . here is a front end loading mechanism that gives you extra strength for the most severe job.

Large, double-acting hydraulic boom cylinders provide ample power to hoist loads weighing up to 15,000 lbs. to full height. Boom and bucket controls may be operated simultaneously.

To fill the big (2½ yard) bucket, this loader develops 25,000 lbs. digging force at the lip. 40,000 lb. pry-out force and 40 degree bucket tip-back at ground level gets full bucket loads, minimizes spillage. It carries loads close and low for maximum stability.

It operates in 9' 6" headroom . . . discharges into haulage units up to 14'.

Exclusive features of the hydraulic system provide an extra margin of protection against mechanical delays.

Bulldozer

Dozer blade attachments are designed to make full use of the extra-production features of the 105. In broad usages such as cutting haul roads for logging outfits . . . pioneering in shale and hard rock . . . clearing fire paths for the Forest Service . . . the Eimco 105 Bulldozer has proven its high-capacity ability the world over.

All attachments are Eimco-built to standard SAE mounting dimensions for the basic 105 Tractor. This means extra performance from every attachment through independent track maneuverability . . . up front visibility . . . power shift operating ease . . . balanced design for maximum stability . . . quality built for dependable on-the-job service.

Excavating Loader

Where digging is extra tough . . . and haulage provisions can be adopted to take full advantage of overhead discharge — the time-proven 105 Excavating-Loader will give you **bonus** loading power at the bucket lip and **bonus** dumping speed to accelerate the entire cycle.

Unique contour of the rugged rocker arms . . . bucket design and smooth, steady flow of engine power transmitted to the bucket lip through the torque converter gets 39,200 lbs. of digging force right where you want it . . . in the pile. Awkward maneuvering to get into dumping position is eliminated in ideal overhead discharge applications.

THE EIMCO CORPORATION

Salt Lake City, Utah—U.S.A. • Export Offices: Eimco Bldg., 52 South St., New York City

New York, N. Y. Chicago, Ill. San Francisco, Calif. El Paso, Tex. Birmingham, Ala. Duluth, Minn. Kellogg, Ida. Pittsburgh, Pa. Seattle, Wash.
Cleveland, Ohio Houston, Tex. London, England Gateshead, England Paris, France Milan, Italy Johannesburg, South Africa

EIMCO

B-239

TO ADVERTISE: All advertising in this section is payable in advance. Rate: $1.00 per line, or $12.00 per inch of 12 lines. Minimum charge $4.00. No discounts; no commissions. Please count your copy carefully to avoid delay. Each line contains 41 characters (34 characters if all capital letters are used). Count spaces and punctuation as one character each. Allow 10 characters for box number, if blind advertisement is desired. Be sure to enclose the correct amount of money with your order. Closing date—15th of preceding month. Example: January closes December 15th.

TO INQUIRE: Be sure to address your inquiry to the advertiser by using the correct box number. Mail your letter in care of Excavating Engineer, South Milwaukee, Wisconsin. Write each advertiser a separate letter. Do not write us for name and address of advertiser. This information will not be given out. We have no information about the equipment advertised other than that shown in the advertisements themselves.

LARGE SHOVELS, CRANES, DRAGLINES — 3 YDS. & UP

FOR SALE

CONSTRUCTION EQUIPMENT

1201 Lima Dragline, 85', 3 yd.
955 P&H Dragline, 90', 2½ yd.
54-B Bucyrus-Erie Drag, 85', 2½ yd.
54-B Bucyrus-Erie Comb. Drag & Crane
1001 Lima Dragline, 80', 2½ yd.
80-D Northwest Drag, 65', 2½ yd.
802 Lima Cranes
604 Lima Comb. Shovel & Crane
25 Northwest Combination Shovel & Crane
80-D Northwest 2½ yd. Shovel
3000-B Manitowoc 2 yd. Shovel
38-B Bucyrus-Erie 1½ yd. Shovel
44 Lima 1 yd. Backhoe
LS-85 Link Belt 1 yd. Shovel
General 1 yd. Shovel
34 Lima ¾ yd. Shovel
22-B Bucyrus-Erie Backhoe
Unit 1020 ¾ yd. Shovel—1 Yr. Old
Bay City, Lorain, P&H & Osgood Truck Cranes
Shovel, Drag, Crane & Backhoe Attach. —Drag & Dipper Buckets for most makes and Models
Euclid Trucks — 27FD, 18FD, 8TD, 36FD, 82FD, 13TD, 14TD, 63TD—Bottom & Rear Dumps
Garwood, LeTourneau, Caterpillar, Euclid & Bucyrus-Erie Scrapers
Huber 3-5 ton Tandem Roller
Buffalo-Springfield 10 ton Roller
International Bulldozers
Allis-Chalmers & Caterpillar Dozers, Front End Loaders, Graders, Carryalls
600 Reich Heavy Truck Mounted Rotary Air Drills (Both Lever Arm & High Mast)
58-BH Joy Champion Rotary Air Drills
42-T, 29-T & 27-T Well Drills
Davey Rotary Truck Mounted Air Drills
Mayhew Rotary Truck Mounted Air Drills
Portadrill Truck Mounted Air Drill

FRANK SWABB EQUIPMENT CO., INC.
313 Hazleton Nat'l. Bank Bldg.
Hazleton, Pa. GLadstone 5-3658

Bucyrus-Erie 200-W diesel dragline shipped in 1950; 125 ft. boom, 6 yd. heavy duty and 7 yd. light weight buckets; some spare parts included; good mechanical condition. Location Melbourne, Australia. Box 3682

LARGE SHOVELS, CRANES, DRAGLINES — 3 YDS. & UP

2-W Monighan Walking-Type Dragline #492, 85' boom, 2-year old D-13000 Caterpillar diesel engine #4S685, 2-yard Hendrix bucket, 2½ yard Page bucket, some spare parts, fair operating condition. Box 3708

SMALL SHOVELS, CRANES, DRAGLINES — UP TO 2½ YDS.

MANITOWOC MODEL 3500 STRIPPING SHOVEL, S/N 3602; equipped with 45' boom, 34' sticks and 2 cubic yd. dipper; powered with Caterpillar D-17000 diesel engine new in 1951; machine is in good operating condition. Price $35,000 as is, where is, and can be inspected at Sunnyhill Coal mine near New Lexington, Ohio. Box 3692

Lima model 34 dragshovel; ¾ yd. bucket; crawler type; 20' cambered boom; GMC 3055-C diesel engine; year 1951; price $11,500.
Lorain model TL-25 shovel combination ¾ yd. shovel and 36" backhoe; crawler type; Cat. D315 diesel engine; year 1950; price $9,500.
DOW & COMPANY, INC.
1820 Elmwood Avenue Buffalo 7, N.Y.

Bucyrus-Erie 22-B, Caterpillar D318 engine; machine used only part time; absolutely perfect throughout; must see to appreciate; ¾ yd. rock bucket; excellent undercarriage; financing available. Call or write Midland Machinery Co., Chillicothe, Mo. Phone 280.

One Bucyrus-Erie Model 41-B, 3 motor AC electric shovel, serial no. 10796, 1½-yd. dipper, cat-mounted, 26" treads; 22'6" boom, 15' handle; good operating condition. Many replacement parts for swing and crowd machinery recently installed or available. Located Mid-West.
One Bucyrus-Erie Model 52-B, Ward-Leonard electric shovel, serial no. 11395, equipped for 3 phase, 60 cycle, 440 volt operation; 2¼ cubic yard dipper, 30' boom, 18' handle; equipped with power boom hoist and electric light plant. Well maintained and in good operating condition. Caterpillar units recently overhauled. Located Mid-West.
One Bucyrus-Erie Type 1030, two-motor A.C. shovel serial no. 10655. Built as tunnel shovel, with short cat frame and 19" wide treads. Tunnel boom and rock dipper in excellent condition, dipper handles fair. Machine presently equipped standard shovel front with ¾ yard dipper, fair condition. Located Mid-West. Box 3710

MISCELLANEOUS EQUIPMENT

Lippmann crushing plant, 18"x30" jaw, 30"x18" rolls, 3'x8' double deck screen, mounted on 11.00x20" 12 ply tires.
24" belt conveyor 45' long, 24" belt conveyor 30' long.
Wms. #6 Jumbo Hammermill, Allis-Chalmers 225 h.p. elect. motor, misc. chutes, shaker screens and hoppers. FRED R. SIEVERS, 7461 So. Lowe Ave., Chicago 21, Ill. Phones RAdcliffe 3-2486-7-8.

MISCELLANEOUS EQUIPMENT

Bucyrus-Erie 42-T blast hole drill and #12 Bucyrus bit dresser, new 1950, used only two seasons, excellent. Price $18,000 at our yard. Bucyrus-Erie 37-B shovel front, cambered boom, like new. Price $2000 at our yard. Fairleads for Bucyrus 22-B and 15-B dragline, excellent. Price $140 and $125 at our yard. WENZEL MACH'Y. CO., 565 S. 10th, Kansas City, Kans. Phone Mayfair 1-1710.

EQUIPMENT WANTED

Bucyrus-Erie 110-B electric shovel for cash. Wenzel Machy. Co., 565 S. 10th, Kansas City, Kans. Phone Mayfair 1-1710.

POSITIONS WANTED

Site engineer now working in England would like to gain experience in construction in civil engineering activities in the United States; will furnish full particulars to anyone who is interested. Write to: Box 3709

Superintendent available; 30 yrs. experience and qualifications covering all types of sewers, water lines, highways, airports, heavy and light excavating earth fill dams; know cost, plans and specifications, materials labor and modern equipment; honest, sober and reliable; best of health and a pusher. Box 3711

Notes from the Manufacturers

American Hoist and Derrick Co., St. Paul 1, Minn., has appointed John W. McEvoy vice president and general manager of the Lebus Manufacturing Co., Longview, Tex., a wholly owned subsidiary. McEvoy formerly was superintendent of structural work at American Hoist's St. Paul plant. Lebus manufactures a line of drop-forged load-binders, snatch blocks and oil field accessories.

Bucyrus-Erie Co., South Milwaukee, Wis., has announced plans for a $12 million drill manufacturing plant near Richmond, Ind. The new plant will provide 300,000 square feet of floor space for the building of blast hole drills and water well and oil well drills. These drills are now manufactured at Bucyrus-Erie's South Milwaukee and Evansville (Ind.) plants. Space vacated at these two plants will be used to expand production of excavating machinery. Construction will begin soon, with completion schedule for late this year or early 1958. The plant will employ about 1,000 persons.

Caterpillar Tractor Co., Peoria, Ill., has announced formation of a new foreign trade group, and two new domestic divisions — manufacturing, and parts and service. The foreign trade group will coordinate all activities concerned with the firm's foreign business. Included will be the activities of Caterpillar subsidiaries in Australia, Brazil, and Great Britain, and two new subsidiaries, Caterpillar Americas Co. and Caterpillar Overseas, C.A. William Blackie has been named president of this group and W. J. Bornholdt, V. V. Grant, J. R. Munro, and G. E. Spain as vice presidents. Blackie and Spain will continue as executive vice president and vice president, respectively, of the parent company. The new manufacturing division will include the company's eight U. S. manufacturing plants, and manufacturing, purchasing and traffic offices. C. A. Woodley, vice president, will head the division. The new parts and service division will include the service department and the parts distribution and parts sales offices.

Drake-Williams-Mount Co., Omaha, Neb. has appointed Hugh W. Williams as sales representative and sales promotion manager. Williams is a grandson of the firm's founder.

Leschen Wire Rope Div., H. K. Porter Co., Inc., St. Louis, Mo., has named John H. Granger and William R. Miller as sales representatives. Granger will cover all of New Jersey and Staten Island, New York. Miller's territory includes all of Arkansas, western Tennessee, northern Louisiana and most of Mississippi.

Frank G. Hough Co., Libertyville, Ill., has appointed Robert L. Knox and Herman R. Brown as assistant sales managers. Knox, who has been a district sales representative, will take charge of distributor sales and contacts with field personnel. Brown, formerly manager of the order and distribution section of the sales department, will assume direction of manufacturers sales including export, government and supplemental equipment as well as scheduling operations.

Marion Power Shovel Co., Marion, Ohio, has named Hoyt E. Cox, Jr. as a divisional sales manager with headquarters in New Orleans, La. His territory will include the states of Louisiana, Mississippi, Arkansas and the western part of Tennessee. He formerly was with Northwest Engineering Co., Chicago, Ill.

John A. Roebling's Sons Corp., Construction Materials Div., Trenton 2, N. J., has reassigned John E. Heald from its southeastern sales district to its midwest sales territory, with headquarters at 5525 W. Roosevelt Rd., Chicago, Ill. The division specializes in wire, strand and fittings for prestressed concrete. John H. Bass, Jr., will replace Heald as sales representative at Roebling's southeastern office, 934 Avon Ave., Atlanta, Ga.

PUT ALL YOUR PROFITS IN ONE BUCKET!
OMAHA
DRAGLINE BUCKET
Omaha Dragline Buckets get out and dig in for you...meaning bigger profits with every load. Alloy steel cutting teeth are tough and sharp. It's faster, smoother working. Nearly 50 years of "know-how" assures quality that lasts in the field. You can't buy a better bucket!
Write today for catalog of complete information and specifications for four types available.
DRAKE-WILLIAMS MOUNT • OMAHA, NEBR.

THE CASE OF

THE DANGEROUS DRUMS

THANKS FOR DROPPING BY, ART. I THINK I NEED A SET OF NEW INJECTION VALVES.

HMMM, YOUR TRACTOR'S NOT VERY OLD. SHOULDN'T NEED VALVES.

SURE ACTS LIKE IT. THE ENGINE IS MISSING AND LOSING POWER!

BET YOUR TROUBLE'S RIGHT HERE, FRED ----LOOK AT THE WATER IN YOUR FUEL!

FRED, YOU NEED BETTER FUEL STORAGE FACILITIES. WATER AND RUST ACCUMULATE IN THESE DRUMS AND THERE'S NO EASY WAY TO DRAIN IT AWAY. JUST IN CASE THOSE VALVES ARE STICKY, I'LL BE GLAD TO CLEAN AND TEST THEM.

WE CLEANED THE VALVES, FRED. THEY CHECKED O.K. AND ARE READY TO GO.

THANKS, ART. YOU SAVED ME MONEY. BY THE WAY, I ORDERED A NEW FUEL STORAGE TANK TODAY!

CATERPILLAR*

*Caterpillar and Cat are Registered Trademarks of Caterpillar Tractor Co.

CAT CARE FOR LONGER WEAR

LET ME HELP KEEP YOUR CAT* EQUIPMENT ON THE JOB!

Caterpillar Tractor Co., Peoria, Illinois, U.S.A.

This 125 cfm Gyro-Flo Compressor and PB-8 Paving Breaker combination is making short work of a heavy pavement job in a large Eastern city.

On any pavement job, you can

BREAK IT UP and FINISH IT UP

in record time with this I-R CONTRACTORS' COMBINATION

1 An I-R GYRO-FLO COMPRESSOR of the right capacity

With the complete line of Gyro-Flo rotary compressors, there's no need to haul around or pay for any more air power than you actually need. Now available in 85, 125, 210, 315, 600 and 900 cfm sizes, you can pick a unit with the *right capacity* to operate as many or as few paving breakers as the job calls for. That means no idle compressor capacity — no overloading that cuts tool pressure and slows up the work. What's more, GYRO-FLO's *proved performance* assures a smooth, dependable air supply that's tops in fuel economy and remarkably free from attention or maintenance.

2 I-R PAVING BREAKERS of the right weight and power

Ingersoll-Rand offers you the most complete line of paving breakers and accessories available today. From the big, heavy-duty, 100-lb Breaker and Pile Driver to the lightweight 20-lb Demolition Tool and Digger — you can match the *tool* to the *job*. Use only the weight and power you need — reduce operator fatigue and save air power cost. In addition, I-R paving breaker steels and accessories, designed and built to stand up longer on the toughest jobs, are available for every breaking and demolition application.

Ask your I-R representative for the complete facts on this time-saving Contractors' Combination.

Ingersoll-Rand 14-502

11 Broadway, New York 4, N.Y.

THE BEST AIR EQUIPMENT FOR BETTER HIGHWAYS